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Established 1859 Pioneer of the Gas Industry

VOL. 125, No. 15
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NEW YORK, SATURDAY, OCTOBER 9, 1926.

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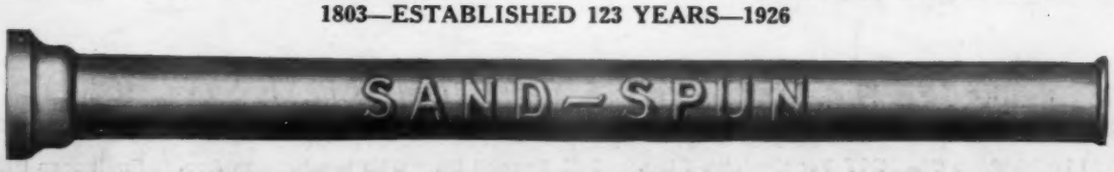

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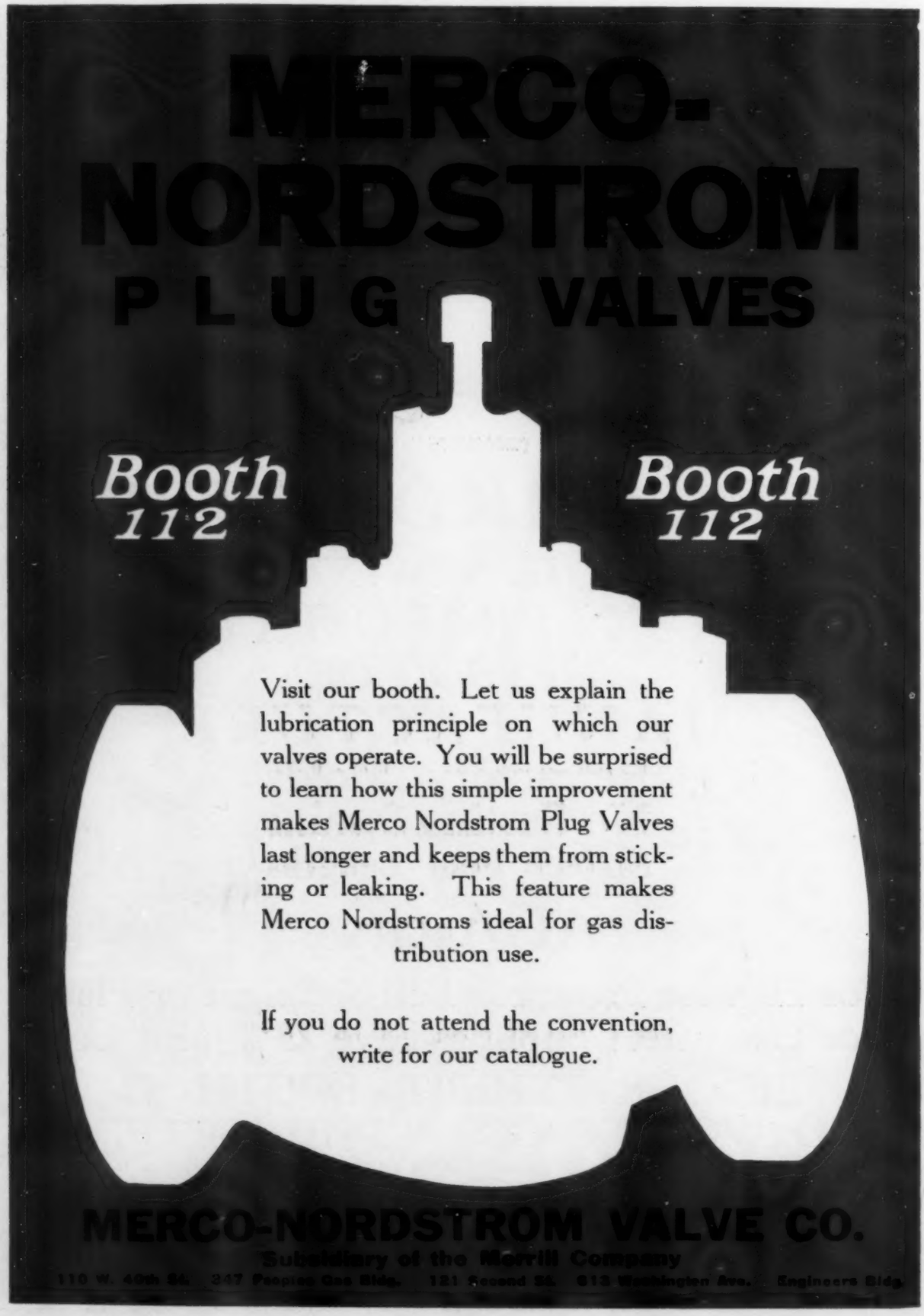
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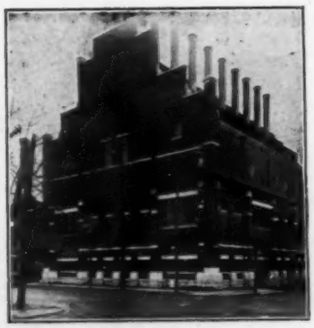

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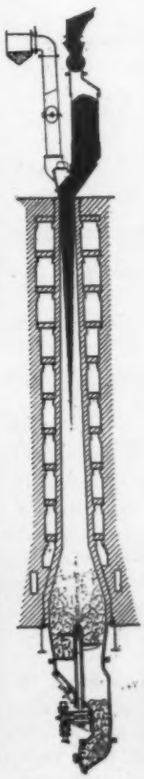

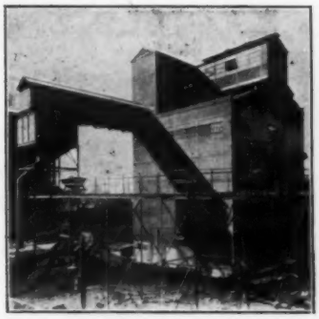

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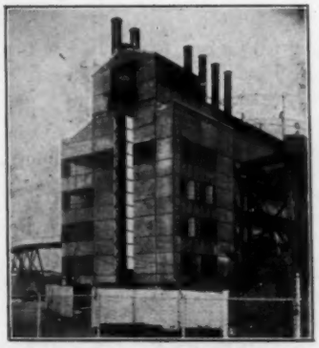

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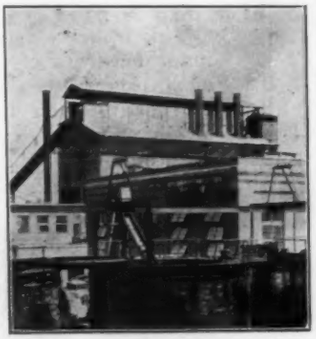

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American Gas Journal

SIXTY-SEVENTH YEAR

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STANTON G. KRAKE, Managing Editor ISMAR GINSBERG, Editor

"MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS"

Contents of This Issue

This issue is devoted entirely to a symposium of manufacturers of equipment. It contains a series of stories written by members of the organizations of these manufacturers, depicting the growth and development of their individual companies, describing the role that each has taken in the general progress of the gas industry, and, being in short, a history of these Companies and of the equipment that they manufacture.

It is a story of vital interest to the gas men, and one that we urge all of them to read and study. For, from it, they will obtain concise and accurate information regarding the various organizations that have been contributing so much to the development of the American Gas Industry from its very foundation to the present day.

Subscription $3.00 per year, including postage, in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada, $4.00; foreign, $5.00—Single Copies, 10 cents.

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AMERICAN
GAS JOURNAL

Established 1859—Pioneer of the Gas Industry

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The Manufacturers

A symposium on their part in past and future gas progress

Ismar Ginsberg

ANY industry is composed at least of two parts. First, there are those that manufacture the commodity or commodities that are merchandised by that industry, and then there are those that manufacture the machinery or equipment wherewith these products are made. Thus, the paper industry makes paper. That is its main function. The makers of the paper machine, beater, calender, and other paper mill apparatus manufacture the equipment wherewith the paper is fabricated. It is manifest that the paper industry cannot progress unless the equipment makers progress likewise. Good paper requires efficient manufacturing apparatus and in order for real progress to be made, it is essential that all parts of the industry are cognizant of the importance of working together and working efficiently to overcome difficulties and to effect improvements of the greatest possible advantage to all.

The gas industry is not only like the paper and other industries in this respect but it is also quite different. In other words while in the gas industry it is absolutely necessary that equipment makers work hand in hand with the gas companies in the development of new, labor-saving and more efficient gas-making, gas-purifying, gas-measuring and gas-distributing equipment, it is also true that the same condition applies as well in the utilization of the fuel both in the home and in the factory. In this respect gas is much different from all other industries, with the exception, perhaps, of the electric industry, for in very few cases is the manufacturer so vitally concerned with the utilization of his product as the gas company.

Two Classes of Manufacturers

Thus, when we speak of the Manufacturers and the part that they have played in the development and growth of the gas industry and the role that they must play in the future, if the ultimate goal of gas is to be reached, we are considering both the manufacturers of equipment used in the gas works and also the makers of various devices in which gaseous fuel is burnt in the home and the factory. It is really of little use to have highly efficient manufacturing and purifying equipment, to make gas of the highest quality and at the least cost, to maintain the most perfectly trained organization, and in fact to conduct the most commendatory sort of business enterprise, if the gaseous product is burnt in poorly designed and inefficient appliances. It is equally ineffectual to try to operate the gas business efficiently and economically with machinery and equipment that do not give the best results. Gas could not be made so as to be classed truly competitive fuel, unless the gas making side of the business had been properly developed.

Thus, the gas industry itself is only as strong as its weakest link. The equipment makers must be up to par with the gas companies, and the gas companies must be as highly developed in their methods as the appliance makers. All must work together for the common end, and all must be imbued with the proper spirit of co-operation and helpfulness in order to present a solid front to the many problems and difficulties that confront the gas industry today and will continue to confront it in the future in even greater number and with greater persistency as gaseous fuel becomes more and more universal in its application.

The Greater Gas Industry

Hence, when we speak of the gas industry, we do not merely refer to the individual gas companies, but we consider it in the much broader light to include all those that are concerned in one way or another with the gas-making and gas-merchandising enterprise. The gas company makes, distributes and sells gas and gas appliances. It has all it can do to contend with the details involved in properly carry-

ing out these functions. The equipment manufacturers produce the various machinery and materials employed by the gas company in its plant and its distribution and metering systems. The appliance manufacturers make the devices in which the gaseous fuel is burnt. Each branch of the greater gas industry has its work cut out for it, and it would be as inadvisable for the gas company to try to make appliances as it would be for the appliance maker to try to make gas. However, this does not mean that there is or should be any sharp delineation between the efforts of each of the three parts of the gas industry. The gas man connected with the gas company can well work in co-operation with the gas engineer of the equipment maker or of the the appliance fabricator. There is much that each can do to help the other, and surely the gas industry, as it is constituted today, and with due consideration of the multitudinous problems that it has to face in the manufacture, sale and utilization of its product, is most emphatically in need of united, properly correlated and adequately exerted effort.

The Manufacturers' Issue

The American Gas Journal is a paper that appeals to all the gas industry. It is of course concerned in all that is of importance to the gas man, no matter what his special interests might be. It has endeavored in prior First Convention Dailies to present the story of the gas man in the gas companies. It has told of the origin and development of the gas associations; it has described the history of gas; it has published a symposium on gas problems, gas aims and gas hopes. It is now primarily concerned with the work that has been done by the manufacturers of equipment and appliances in enhancing the progress of the American Gas Industry. This symposium is pertinent and interesting to all gas men. The manufacturers in the following pages tell their story in their own words. This issue of the American Gas Journal is essentially their issue. We commend their enterprise, and thank them for their support. We urge the gas man to read their story, for it is one that has been drawn from their own, long-

AN APPRECIATION

Major Alexander Forward, Secretary-Manager of the American Gas Association, Commends the Manufacturers

"Altogether too little has been said and written about the manufacturers' contribution to the gas industry. This is not, however, in my opinion, due to any real lack of appreciation of the part they have played in the development and destiny of our business.

"Few industries the size of ours can boast of a national organization in which all branches have placed their shoulders to the wheel in a common purpose, and in which there has always been a singular lack of territorial feeling, trade jealousies and petty dissensions. We are a united industry and therein lies our strength.

"If one would desire to know visually just how big a factor the manufacturers are in this business of ours, let him view our annual convention and exhibition; this one in particular. Remove from the Million Dollar Pier the exhibits of appliances and equipment, and we could have held this Eighth Annual Convention in any big hotel. Not only would the attendance be greatly reduced without our manufacturers, our purchasing agents and their friends, but everything else would suffer in consequence.

Alexander Forward

"This Eighth Annual Convention is big and important and interesting and it is largely because our manufacturers have made it so. What other feature of a gas convention is more absorbing than the exhibition? Where is there a better barometer of the trend of our sales?

"One of the chief topics of interest in our industry today is the splendid progress being made by the appliance testing laboratory at Cleveland. No one movement ever inaugurated by the American Gas Association has come quite so close to the hearts of the manufacturers as this one. From the inception of the project and leading up to the time when the laboratory became an actuality and continuing to this moment, our manufacturers have given us their fullest measure of co-operation. There may be better examples of teamwork in the industry but I have not heard of them.

"Our industrial gas research program is another outstanding example of whole-heated co-operation. In no other way can we hope to develop our gas-burning equipment to build up sales of gas for industrial purposes and to keep the business we already have except by merging our interests for the common good and striving for a common goal.

"Our manufacturer company members, numbering more than 400 at this writing, with an increase of 56 this year, occupy important positions on the Executive Board and committees of the association. They constitute as vital a part of the working equipment of the association as any other group, and their unselfish service in behalf of the industry is too well known to need repetition here.

"Many times our manufacturers have told us that they stand ready to support any development looking toward new and enlarged uses of gas. They have done so in the past, often at monetary loss and personal sacrifice because of their faith in the stability of the industry and its manifold opportunities for expansion. In this regard they have set an example worthy of emulation by every member of our association."

extending experience. It is a human document in every case, showing concisely and accurately what they have done for the common welfare of the gas industry and indicating what they hope to do in the future. It reveals what can be expected from them, and unquestionably proves that the manufacturers of equipment and appliances are ready to do their share in promoting the general welfare of the gas industry. It exemplifies the happy state that exists in the greater gas industry, of which every member is now working with might and main to show the American people that their future fuel supply, no matter for what purpose it might be used either in the home or the factory, must be furnished by the gas industry. Thus our industry, alive as to its real function in modern society, permeated with the spirit to attain the great future prophesied for it by its founder at its very inception, resolved to make its product the universal fuel, is now attacking its problems and making marked progress toward its goal, not as a heterogeneous mixture of individual, separately-actuated and disjointedly-working entities, but rather as a combination of organizations operating with an enlightened spirit, explicitly characterized by the desire to forget individual advantage and to work whole-heartedly for the common welfare.

CO-OPERATION BASIS OF PROGRESS

W. E. Derwent, Vice-President of the George D. Roper Corporation and Chairman of the Manufacturers' Section, American Gas Association, Urges Continued Co-operation of the Manufacturers and Gas Companies

"The amount of co-operation between the different branches of the gas industry is greater than in any other similar organization. Such co-operation may be said to be fundamentally the basis for the widespread use of gas today.

"Whether the utilities or the appliance manufacturers have given the greatest service to the industry as a whole is a question that can never be universally settled to everyone's satisfaction, but it is conceded by all that without the services of either the industry would have died in its infancy.

"Manufacturers of gas appliances have contributed greatly in the progress and development of the industry. Efficient gas appliances are responsible for the large volume of gas that is sold today. Every new and improved gas burning device increases the sale of gas.

"In the early stages of the industry when gas was solely used for lighting, the development of electricity for illumination purposes made serious inroads in the gas light business. The gas appliance manufacturers by developing new gas-using product saved the industry from ruination.

"After gas lighting became obsolete new uses for gas were found by appliance manufacturers The gas appliance manufacturers, by continually improving old products and producing new ones, have stifled competition. The universal use of the gas range is the result of the untiring efforts of appliance makers. Such improvements as oven control, ventilated oven, etc., have made the gas range the most desirable of all cooking appliances.

"The increased use of gas for industrial purposes is due to efficient gas appliances. Gas appliance manufacturers have been continually in search of new outlets for gas through new gas burning apparatus. Every new outlet for gas is a boost to the industry and now, after years of experimentation, you will find an efficient gas appliance wherever heat is used.

"Whether gas for house-heating will be universally used depends upon the efficiency of heating appliances. The manufacturers of gas-fired furnaces are the ones upon which depends the success of gas as a fuel.

"Gas appliance manufacturers have for years stood the expense of national advertising. It is this advertising which in a large way is responsible for the position gas now holds. People, by continually seeing gas appliance advertisements, became acquainted with the merits and uses of gas.

"Gas, in order to continue its popularity and compete with its competitors, must be nationally advertised. This must be carried on by appliance makers. Gas for home-heating will never be universally used until its advantages have been continually placed before the public by national advertising.

"The aim of every appliance manufacturer should be to produce a more efficient product. No gas-burning appliance is perfect, so improvements must be continually made.

"The continued prosperity of the industry depends largely upon the co-operation between appliance manufacturers and utilities. Every improvement in the entire industry benefits every individual in the industry."

THE MANUFACTURERS OF WORKS EQUIPMENT

The first function of any industry is to make some product or perform some service. The primary business of the gas company is to make gas. This is the first step in the long process which culminates in the satisfied gas customer. Thus, the makers of gas-manufacturing equipment as well as of the other machinery that is used around the gas works, such as, the purifying and metering apparatus, the boiler plant appliances, the materials and raw products employed in the gas-making progress and the miscellaneous equipment of the gas office are the ones that first occupy our attention.

It is needless to state that they have done much to advance the cause of gas. It is all a matter of

record. The technical progress of the industry is known and it is not our purpose to elaborate on it here. It is interesting however to note in how many cases close co-operation between the equipment maker and the gas company engineers has led to widely-disseminated advantageous results. It is a happy circumstance that the manufacturers are not averse to acknowledging their indebtedness to the gas company engineers and neither are the latter and the gas industry as a whole inappreciative of the assistance that has been given them by the makers of gas-manufacturing, gas-purifying, etc., apparatus. The gas industry, in its broader sense, is to be congratulated that such a sincere spirit pervades it, for without this there could not have been the great progress that has taken place since its beginnings. And what is perhaps more important, the development that must take place in the future, the extent of which is now becoming evident from the great gains that are being made by gaseous fuel in new fields, could not be hoped for unless there was such co-operation.

Many Problems Require Attention

The gas industry is today confronted with many problems. It is energetic in going after more business in both the domestic and industrial fields. It is getting considerable business, but what progress is being made now will be but insignificant after the people of this country are really educated to know what gaseous fuel can do for them and begin to demand it for house heating, for refrigeration, for incineration, water heating, and industrial heating of all sorts. Today the gas industry is working under the handicap of a rate structure which was suitable when the only use for gas was for illumination. It is evident now that the rate must be changed, must be built up along scientific lines. But it is not only the rate that must be corrected. The gas-making process and all the other auxiliary processes that are carried out in the gas works must be efficiently and economically carried out. It is still a question as to what the ultimate gas-making process will be, what must be done with the by-products recovered, where will the ammonia liquor find a market now that it is beginning to meet with such marked competition from synthetic ammonia. These and many others are problems which must be solved by the gas industry and in their solution the manufacturers will and must unquestionably take a prominent part.

In the following stories the equipment manufacturers tell what they have done in the past. They make most interesting reading and indeed most important reading, for if there is any justification at all in basing one's predictions on past performances, it is patent from these statements that the gas companies can expect the utmost co-operation of the manufacturers in their endeavor to solve their problems and can feel that this co-operation will be given whole-heartedly and will be of such a high technical caliber that there can be no reason at all for doubting the ultimate solution of these problems and the ultimate success of gaseous fuel in reaching its goal, the establishment of gas the universal fuel of the home and industry.

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MONO CAST CENTRIFUGAL PIPE

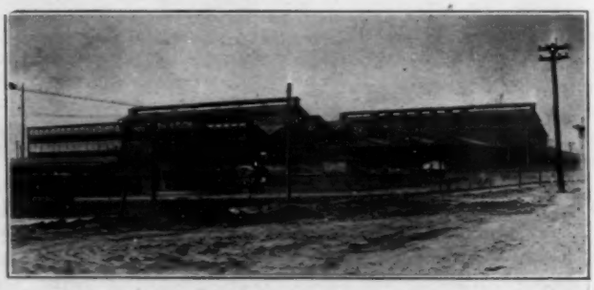
Cast iron pipe is a comparatively old article. It has been known for three hundred years and more. But it was only until very recently that the century-old process of casting the pipe, with all its attendant difficulties and liability to yield a poor product, was improved by the centrifugal method. Today this is by far the outstanding development in the cast iron pipe industry, one that is of great significance to the distribution engineer of the gas company.

Ralph R. Silver, manager of the Department of Statistics of the American Cast Iron Pipe Co., Birmingham, Ala., describes below the essential details of the Mono-Cast process, one method of making cast iron pipe centrifugally.

"The latest development in the manufacture of cast iron pipe is the Mono-cast centrifugal pipe process, perfected by the American Cast Iron Pipe Company.

"Until a few years ago it had been almost a century since any practical commercial improvements revolutionizing cast iron pipe had been announced. The previous improved departures from old established methods involved vertical casting in dry sand molds, adopted the middle of the last century.

"Before this time pipe had been for many years cast horizontally in green sand molds with a core having a clay or loam coating. This method had disadvantages and the vertical casting method became at once popular and the foundries using the old horizontal molds rapidly remodeled their plants or went out of business.



General View, New American Cast Iron Pipe Company Plant

"For many years engineers in a number of countries have been trying to develop a machine which would produce cast iron pipe centrifugally. But until recently all attempts had been unsuccessful.

The Mono-Cast Process

"The new Mono-cast process recently perfected employs the sand mold in a different way from that used in the old sand cast method. In making the new Mono-cast pipe the metal is poured into a revolving sand-lined flask against the sides of which the metal is thrown by centrifugal force without any chilling action. The molten metal is distributed evenly throughout the length of the mold thus securing a pipe of uniform thickness from end to end.

"The new pipe is manufactured in 16 feet lengths

To Test For Uniformity of Section, Inclusions, Blow-Holes, etc., Pipe Was Split Endwise. (American Cast Iron Pipe Co.)

and in diameters of 4, 6, 8, 10 and 12 inches. It is bell and spigot with bead on the spigot end, and made under specifications providing for seven standard weights. It is the same reliable grey iron structure of the standard cast iron pipe which has been made in the casting pits of modern pipe foundries for many years. Being cast centrifugally, however, it acquires certain characteristics which increase its serviceability to an extent not obtainable with pipe made in the usual way in vertical or horizontal molds.

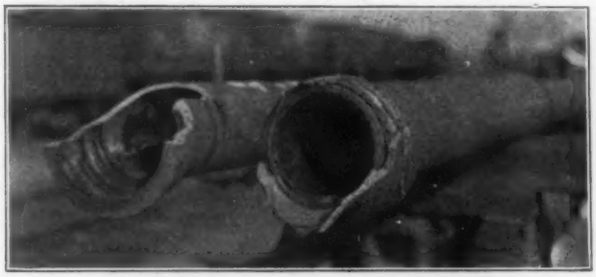
"Mono-cast pipe presents a good appearance. Both its outside and inside surfaces are clean and smooth. The sections are uniform both circumferentially and longitudinally and the pipe are round and straight. The pipe are free from shrinkage cavities, gas pockets, blow holes and solid inclusions of all kinds.

Product Thoroughly Tested

"The new product has been thoroughly tested. These tests show Mono-cast pipe to have forty per cent better resistance to hydrostatic pressure than the ordinary sand cast pipe, twenty per cent greater value in cross bending, and twenty-five per cent greater value in withstanding shock. These higher values for the physical properties of Mono-cast pipe are obtainable solely by the new method of centrifugal casting on a refractory mold which makes a denser metal, and further results in a perfect cleansing of the iron which removes all foreign materials before the iron congeals.

"A modern foundry has been constructed for the manufacture of Mono-cast pipe. In the new plant working conditions have been greatly improved. The new shop is cooler in summer and warmer in winter and much cleaner. Practically no hand labor is left, as machines do everything and men are needed only as machine operators, instrument men, etc.

"As there is no body core, Mono-cast pipe can be manufactured cheaper than ordinary sand cast pipe.



Fracture of Pipe Joint Broken by Cross Bend Test

Mono-cast pipe are made in any wall thickness desired. This enables the buying public to use a lighter weight pipe where its use is justified under the usual service conditions. This gives a corresponding reduction in weight with the attendant saving in iron and freight cost."

✿ ✿ ✿ ✿

FIGHTING THE RUST PEST

Wherever iron is used—and where is this metal not used!—there will be found the rust pest. Corrosion of iron is a matter of the highest importance to industry. It is hard to think of a more important problem. Volumes have been written on this subject and many researches and investigations have been made both to determine its causes and to develop methods and means of combatting this insidious enemy of that most useful of all metals and construction materials, iron.

It is accordingly with a great deal of pleasure that we publish below the interesting story of rust and the work done by The American Rolling Mill Company, Middletown, O. D. M. Strickland, research engineer of that company, has prepared this statement.

"What would it be worth to the gas industry if some one should find a way to eliminate the annual loss from rust? Such an eminent authority as Sir Robert Hadfield made the statement that the yearly rate of corrosion is almost equal to the yearly production. The gas industry, in common with all other industries, is paying its annual tribute to rust.

"In an effort to save industry from this tremendous waste, manufacturers and scientists have done some very effective work. First, they discovered the cause of rust. It is an electrolytic action, the same action

that takes place in an ordinary galvanic battery. If you put two strips of different metals in some conducting fluid, and connect the pieces by running a wire from one metal to the other above the fluid, an electric current is started. It flows through the liquid, and the strip of metal from which the current flows gradually wastes away.

The Remedy

"That is exactly what happens when ferrous metal rusts. With the cause known, the remedy is obvious. The higher the degree of purity, the slower the rate of corrosion. This then became the problem of the manufacturer serving the gas industry—the production of a ferrous metal that should contain as little as possible of the elements, such as carbon, phosphorus, manganese, sulphur, silicon, etc., which tend to segregate or bunch up and accelerate the rate of corrosion.

George M. Verity, President,
The American Rolling Mills Company

"In these segregated areas of metal sheets and plates, whether used for gas holder or factory roof, pitting is a most destructive form of corrosion. The electrolytic action is rapid, and in due course makes a hole through the metal. The more numerous these areas the greater the destructive work of corrosion.

"Pure iron, because of its density and homogeneity, will withstand the attack of corrosion far better than steel, which is always higher in its percentage of impurities. True, the iron will rust, but the rusting action in highly refined iron is much slower and uniformly distributed over the entire surface.

Corrosion in the Gas Holder

"This is of particular importance to the gas industry. Take a gas holder for instance. It is often subjected to unusually severe corrosive action. The water seal inside the holder may be loaded with corrosive compounds. Then, as the holder is raised and lowered, the outside is exposed to alternately wet and dry conditions. The electrolytic action is intensified It is for these reasons that many companies are using pure iron in their lifts and crowns.

"The removal of snow and ice from the crown frequently abrades the paint film, exposing the metal. Pure iron, because of its rust resistance, is exceptionally well suited for minimizing the work of rust. Moreover, the condensation of water on the sides of a holder form a film surcharged with oxygen. Experience has proved the durability of pure iron even under this destructive condition. Then, too, the film of moisture inside the crown, never having an opportunity to evaporate, dissolves any soluble gaseous compounds which are especially destructive.

Work in England

"Not only in America, but in England, engineers are making careful investigations as to the value of pure iron for the gas industry. In the 1925 report of the Wrought Iron Tube Inquiry Committee of the Institute of Gas Engineers of England their findings are as follows:

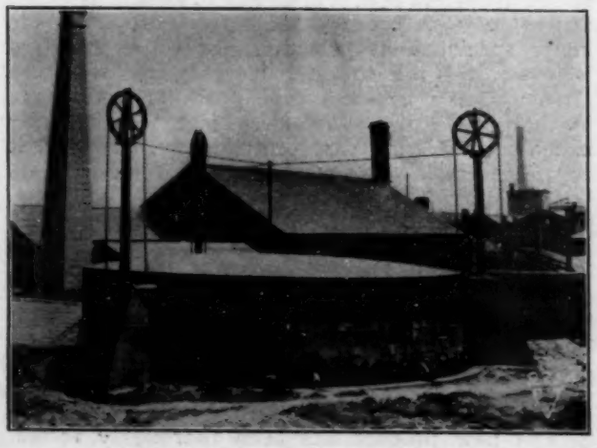
"'1. The sample of very pure iron (Armco) is most resistant to corrosion by siphon liquor (but is excelled by the sample of pre-war wrought iron as regard resistance to corrosion by distilled water.)

"'2. Averaging all the results, the following figures are given as representing the relative magnitudes of the corrosion experiences by gas barrel composed of the respective materials:

Wrought iron of good quality, pre-war	100
Very pure iron (Armco)	103
Wrought iron, post-war	108
Mild steel	111
Mixture of steel and wrought iron	128

(N. B. The larger index number indicates the greater corrosion.)

"'3. It is emphasized as of importance that the character of the rust produced by the gas stream in mild steel differs very materially from the rust in iron, the steel rust being in form of a fine, impalpable powder liable to be carried forward with the stream. The irons, on the other hand, were characterized by massive, heavy rust (nodular in the case of the very pure iron 'Armco.')



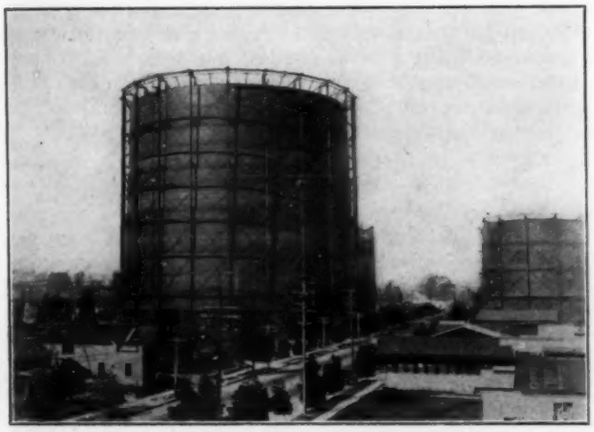
Old Murdock Gas Meter (Armco)

"'4. In a stream of moist coal gas, 'The superiority of Armco ingot iron over the sample of wrought

iron, and of the latter over the sample of mild steel is clearly indicated.'

The Old Murdock Holder

"There is hardly a gas man today who does not know about the old Murdock gas holder erected in England in 1792. It was in continuous service 119 years. Has the gas industry paid a severe toll to rust by getting away from this old iron with its high demands of purity? This is the question the gas engineer of today must answer.

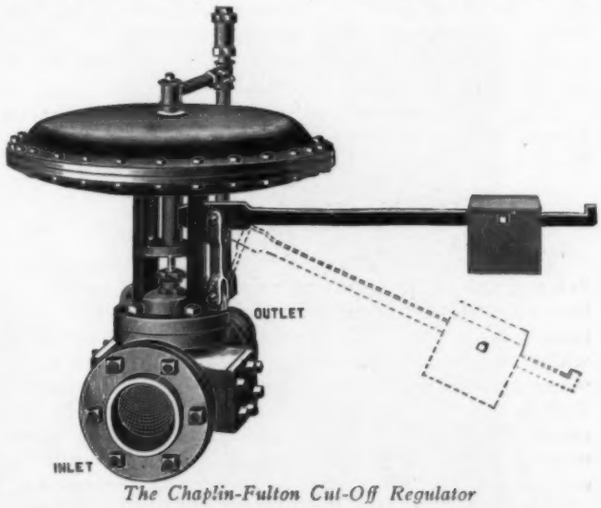


Los Angeles Gas Company Holder With Armco Iron Lifts and Crowns

"Such examples as the Murdock holder and their long life are justification for the extensive research and development done by the American Rolling Mill Company in the production of Armco ingot iron The corrosion-resisting properties of pure iron are equally evident whether it is used for gas holder construction, acetylene gas generators, breeching, coal handling equipment, pipe, roofing, siding, ventilators and smokestacks.

"Not only has pure iron contributed economies for these purposes, but also as a base for vitreous enameling which has tremendously popularized the modern stove and range. Who does not appreciate the part played by vitreous enameling in such gas appliances for the home? This, too, in a large measure, is the contribution of pure iron.

"By its demonstrated economy in all phases of the gas industry, pure iron is entering more and more into construction work and gas appliances with corrosion-resisting qualities on the one hand and gleaming beauty on the other."



A PIONEER IN GAS REGULATORS

The first gas regulator was made in the Steel City. It is an instrument that has gone far to help the gas man in his distribution problems and has also been useful in the application of gas to industrial purposes. Regulators and controlling instruments are essential in many industrial operations and particularly so in the gas industry where it is necessary to control the flow of so elastic a substance as gas. The fact that manufacturers have specialized in turning out properly designed controlling and regulating devices has enabled the gas engineer to simplify his distribution work, and has gone far to contribute to the general progress and development of the industry.

In what follows is given the story of the pioneer of regulator manufacturers, the Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa.

"The first gas regulators, to be built in this country, were manufactured within a stone's throw of the old Block House, at the forks of the Monongahela and Allegheny Rivers. This weathered old land mark still stands to remind Pittsburghers of the famous Fort Duquesne, where General Forbes repulsed the French and Indians, about 1754. The name was changed to Fort Pitt in 1758.

"One hundred and twenty-three years later, the first company ever to make gas regulators was incorporated as Chaplin-Fulton Manufacturing Company on the ground made famous in those pre-Revolution days. The present plant stands on exactly the same site where the business was born in 1881. When the Steel City's 'Golden Triangle' was merely

The Chaplin-Fulton Cut-Off Regulator

'The Triangle,' Louis B. Fulton and M. B. Chaplin formed the partnership which pioneered in gas control apparatus. Mr. Chaplin was the business man, and Mr. Fulton was the inventor and mechanical genius of the firm.

"In their early days, this company manufactured various equipment not only for the gas industry, but for well drilling and certain specialties for other industries.

Formerly Made Gas Meters

"Gas meters also formed a large part of the early production being manufactured continuously for twenty years. They were discontinued in 1914 as for several years before that practically the entire

attention and efforts of the organization were centered on gas regulators and closely related equipment.

"It was in 1886 that the original Fulton gas pressure regulator was first patented. At that time, the development in the uses of gas for fuel and light had reached a point where the problem of regulating and controlling its distribution called for new and special equipment.

The First Regulator

"The first regulator was naturally a crude affair, and in the forty years since it was devised and put on the market, steady improvement in design and operating methods have evolved a great variety of regulating devices of great accuracy and reliability.

The nearest of the modern Chaplin-Fulton products to the original gas pressure regulator invented by Mr. Fulton, is now presented by the Fulton low pressure regulator.

"The automatic cutoff device was patented by Chaplin-Fulton in 1889. This device has remained practically unchanged for the differences are not radical between that in use today and the type first evolved by Mr. Fulton.

"Almost every year during the thirty-five years that Chaplin-Fulton has been catering especially to the gas industry, the company has either brought out a new device or made improvements on those which they had previously been making.

"Among these was the introduction of the present Fulton Duplex sensitive gas governor, patented in 1907.

Two New Regulators in 1926

"As late as the first of this year the company developed two new styles of regulators for maintaining a constant pressure at the discharge end of a compressor. One is the Fulton compressor regulator which is placed in the bypass line around the compressor from discharge to suction. The other is the Fulton throttling regulator, which is placed in the suction line of the compressor. By the use of these newest regulators, is accomplished a more uniform pressure in the discharge line from the compressor.

The Fulton compressor or back pressure regulator, when placed around a low pressure gas compressor, used for industrial heating appliances, will open and return any discharge pressure in excess of a given amount to the suction.

"The Fulton unloader or throttling regulator is placed in the suction line to the compressor and will unload or load at any discharge pressure desired, by merely adjusting the weights on the lever.

"Though the need for regulation has multiplied in each use and in diversity of usage, these pioneers have always kept apace with equipment to meet every requirement. Today, Chapin-Fulton products for the regulation of gas meet every type of gas control within a range of from a few ounces to hundreds of pounds, and under every conceivable condition of service."

BLOWERS, BOOSTERS AND EXHAUSTERS

Founded in 1893, The Connersville Blower Co., Connersville, Ind., has been active in the development of blowers, boosters and exhausters. The story of the company and the products it manufactures is told below by O. L. Rippetoe.

"The Connersville Blower Company was organized in 1893 to build Rotary Blowers, Gas Exhausters, Boosters and Pumps of the two-impeller type with impellers designed along mathematically correct lines, permitting accurate calibration while machining, thus making possible the minimizing of the clearance space between the impellers with a corresponding increased efficiency. The characteristics of the curves being such that the clearances within very close limits can be determined before assembly, permitting a degree of accuracy highly essential to the proper assembly of the machines.

"The company is headed by Mr. John T. Wilkin, president and chief engineer; Mr. J. E. Huston, secretary and treasurer, and Mr. R. T. Huston, vice-president and superintendent, all of whom have been resposible for the stable growth of the company since its founding. Beginning with meager shop equipment and a force of only a few men, a conservative growth has been made in which new buildings and modern accurate machine tools have been added as increased demand and betterment of product required the change in equipment. The present plant and yards now cover approximately 10 acres of ground with 128,000 sq. ft. of floor space in office, pattern shop, foundry and machine shops, exclusive of storage yards.

Adjustable Quarter Box Journal Bearings

"Among the first improved features to be offered by the company was the ring-oiling adjustable quarter-box journal bearings. This bearing is so designed that perfect alignment of the rotating parts can be maintained with easy adjustment, and a bearing the full length of the journal is assured. It is also possible to keep the journals snug, a feature essential to the continuity of service, since accurate gear centers must be maintained. The bearings are extremely rigid in their construction, are designed for economy of lubrication and have proven very successful.

Double Drive Units

"There are many methods of applying power to the driving shaft or shafts of a rotary machine. The most efficient and practical, however, where steam engines are used as the motive power, especially in the larger sizes, is the double drive arrangement including either a cross compound engine or a pair of twin simple engines. With the double drive units the shafts of the machine are extended at opposite ends of opposite impellers to form the crankshaft of the engine, and the crank discs are located on the impeller shafts in such a position that the torque delivered by the engine is transmitted to each impeller at the point of maximum power consumption, and the crank pins pass the dead center with the impellers in their balanced position.

High Speed Gas Pumps

"The latest improvement which has been brought out by this company is a high speed, high pressure booster in which the general construction is the same as previously used in the high pressure gas pumps, except that these machines are equipped with gears having teeth which are flexible enough to accommodate themselves to the unavoidable errors in shape or spacing of the teeth. It has been proven by practice that only a small amount of flexibility is required to accomplish smooth running and avoid the hammering which is produced by the slight imperfections of rigid gears.

"In addition to the improvement in gears these machines also have high inertia impellers, the flywheel effect of which tends to produce uniform angular velocity of both impellers and thus prevent the variable torque and work on the shafts and gears.

"These improvements permit quiet and successful operation of these high speed, high pressure gas pumps at speeds more than double the former maximum speed considered allowable, thus increasing the volumetric and compression efficiencies and allowing these machines to be coupled direct to electric motors without the intervening reduction gears. Machines of this type are now in service and giving excellent satisfaction."

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CALKING GAS HOLDER SHEETS

From a 150,000 cubic feet holder built in 1903 to holders of 5,000,000 cubic feet capacity and greater at the present time is the record of the Cruse-Kemper Co., Ambler, Pa. One important development in which this company was principally concerned was the calking of gas holder sheets, metal to metal, to obtain a perfectly tight, leakproof holder.

The Plant in 1906, Cruse-Kemper Co.

S. E. Fairchild, Jr., chairman of the board of the aforementioned company, tells below of its activities in the gas field.

"Our first gas holder order was taken in December, 1903. It was a one hundred and fifty thousand cu. ft. holder for Marlboro, Mass. It was soon followed by a 10,000 for the Reading Railway in Philadelphia, a 51,000 cu. ft. for Mason City, Ia.; 25,000 for Egg Harbor, N. J.; 20,000 for Cambridge, Md.; 51,000 for Bridgeton, N. J.; 386,000 for Fitchburg, Mass., and a 55,000 for Jenkintown, Pa. We think all of these holders are working yet.

"In the early days it was troublesome to get gas holders tight. Red lead was tried between the seams; also strip lead tape; numerous other fillers; the seams were painted with sal ammoniac so that they rusted tight. But you could smell escaping gas "a mile away" from a gas plant. Holders would not stay tight and a contractor never knew when he was through with a job. Water gas increased the difficulty, as it was much harder to hold than coal gas.

Calking Holder Sheets

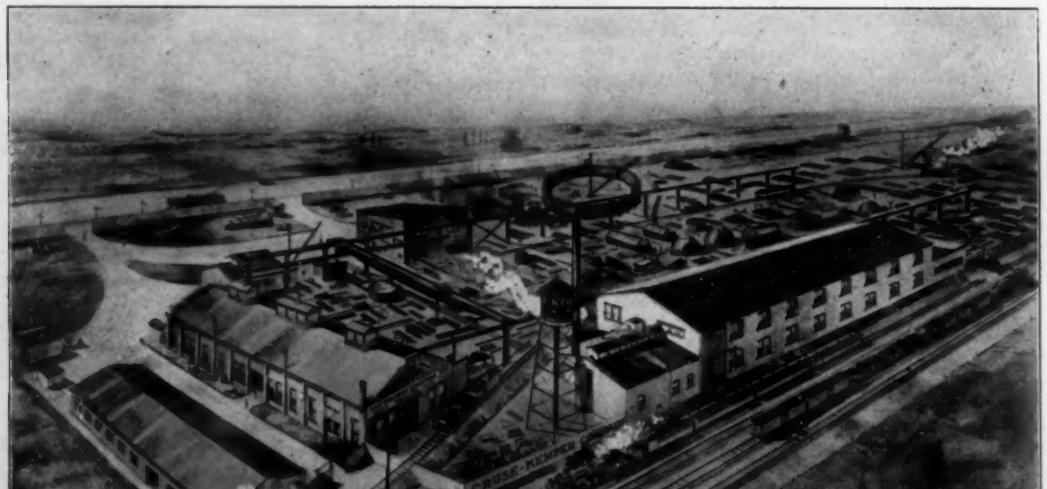
"After continuous experiment we found that we could calk No. 10 gas holder sheets, metal to metal, gas tight as assembled. No fillers were necessary. A calking hammer skillfully applied did the trick and then our troubles in getting holders so that they

S. E. Fairchild, Jr., Chairman of the Board, Cruse-Kemper Co.

stayed tight were over. Rarely do we have any worries over a job after the last sheet is calked and the holder rides for the test.

"Buyers were a bit skeptical at first, and hesitated about paying the little extra money for the heavier sheets and the calking, but that feeling soon passed away and we also found that we could increase the thickness of the water courses and other "wear out" parts of the holder, making a sound sturdy structure, likely to last for 50 years.

"Our first 1,500,000 was quite an effort, it was



The Present Plant, Cruse-Kemper Co.

built for the Harrisburg Gas Company about 1910. The New Haven 3,000,000 came along about the same time and seemed very heavy construction for our small plant and equipment.

"When our first 5,000,000 was booked for West Conshohocken, Pa., we were in excellent shape and it gave us little trouble. It was completed on time.

"Birmingham, Ala., 5,000,000 went even better and was completed well ahead of time.

Purifying Equipment

"In purifying equipment the story is much the same. First we built the plate covers for the cast iron boxes. Then small, 'all plate' boxes—about 8 ft. diam. by 8 or 10 ft. high. Last year we built for Washington, D. C., three sets of purifiers, 35 ft. wide, 13 ft. deep with a total length of 336 ft. for Pittsfield, Mass., three units each 25 ft. diam. by 12 ft. high.

We changed our officers recently, Frank G. Deker is now president; S. E. Fairchild, Jr., chairman of the board; John H. Blanke, vice-president and general manager; F. Regnault Fairchild, secretary and treasurer. This to give the younger men a keener interest in the job and more responsibility.

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SAVE THE SURFACE AND YOU SAVE ALL

The Yankee inventor, who is well-known in American industry for the numerous inventions he is responsible for, also turned his attention to the development of a paint which really does what the well-known slogan of paint-makers of America indicates.

Joseph Dixon was a real inventor, a man whose mind just teemed with inventive ideas. His products are used in a great many industries and his paint products in the gas industry.

L. M. Stockings, manager of Paint Sales Department of the Joseph Dixon Crucible Company, Jersey City, N. J., gives below an interesting story regarding Mr. Dixon and his work, as well as that of his company.

"That much of America's life had a New England genesis can well be understood. It was not the first section settled, but conditions and blood soon produced inventions, organization and self-expansive government there. Men looked upon the sea and horizon to find new zones for their endeavor. Joseph Dixon was born at Marblehead, Mass., in 1799, in the first settled decades after our Revolution. It was his destiny to lift America's chemistry, metallurgy, etc., to a new high plane. He invented the graphite crucible and manufactured it commercially as early as 1827. He also invented and sold Dixon's Stove Polish (carburet of iron). This brought his name familiarly into the life of every housewife, for those were the days of the big kitchen cook stove.

"Up to 1847 Mr. Dixon's business was located at the historic port of Salem, Mass. But at that time New York City and Jersey City were coming into prominence in world and national trade and manufacture. Mr. Dixon decided to move to Jersey City and he founded the firm of 'Joseph Dixon & Co.' in

1847. In 1868, just a year before his death, the Joseph Dixon Crucible Company was incorporated to market world-wide its famous products covering almost every use for graphite. It was and is the largest concern in that business. Its mines are at the historic village of Ticonderoga, N. Y., under the ramparts of ancient forts that breathe of America's birth and struggles and that still sound the immortal names of Montcalm, Arnold, Ethan Allen, et al. The flake graphite and flake silica-graphite found there have no equal for their particular uses. The product is milled as well as mined there and Dixon's Silica-Graphite Paint was opportunely discovered there some sixty-six years ago through rather accidental use on a piece of discarded machinery left in the open.

A Man of Many Inventions

"In Joseph Dixon's brain teemed many inventive ideas in a period of the world's history helpless enough in facilities. His first invention was a machine for cutting files, before that made by hand. He became a printer, and engraver on wood, manufacturing his own wood type and, as with numbers of others in that day, artisanship and art went together; he became a skilled wood carver. He was a great man, a man of lovely and useful mind. He went ever on and on in good and industry and sociability. He invented a matrix for casting type. Here destiny stepped in with power, greatness and invention. The melting of type material led to the invention of the crucible. Formerly the crucible container also melted into the metal contained. From the time he was twenty-one, Joseph Dixon was regarded in New England as an expert chemist. He even studied medicine. He had physiological and pathological ideas. He discussed health, diseases, cures. He made lenses, grinding with graphite to accomplish finished smoothness. All science was kindred to him. He invented reflector-portraits (the camera). He built a locomotive with a double crank that would not center. He was the first man to use collodion in photography. He advanced lithography on stone, first printing by type, then by solar process. He patented a process of printing bank and government notes by color printing.

"Protective silica-graphite paint was added 66 years ago and two years ago the company added Red Lead-Graphite Primer and recently Aluminum-Graphite Primer and recently Aluminum-Graphite Paint and Silica-Graphite Paint in a light and medium gray color to its long-enduring paint products.

"From 1827 to 1869 Joseph Dixon headed the business. He was succeeded in the industrial management in time by his assistant, John A. Walker, who as vice-president and general manager, extended the company with the growing times. Mr. Walker died in harness, in 1907.

"In 1889 the company had again been reorganized, when the great Jersey City banker, E. F. C. Young, became president. He used his power and knowledge greatly to help the company. Mr. Young died in 1908, when his son-in-law, George T. Smith (long connected with the Pennsylvania Railroad in New York City) became president, and under his modern hand still further advances have been made. The other officers of the company, trained in the Dixon maxim of a perfect graphite service for the world's art and industry, are J. H. Schermerhorn, vice-president; Harry Dailey, secretary, and William Koester, treasurer."

PROGRESS IN TWENTY-FOUR YEARS

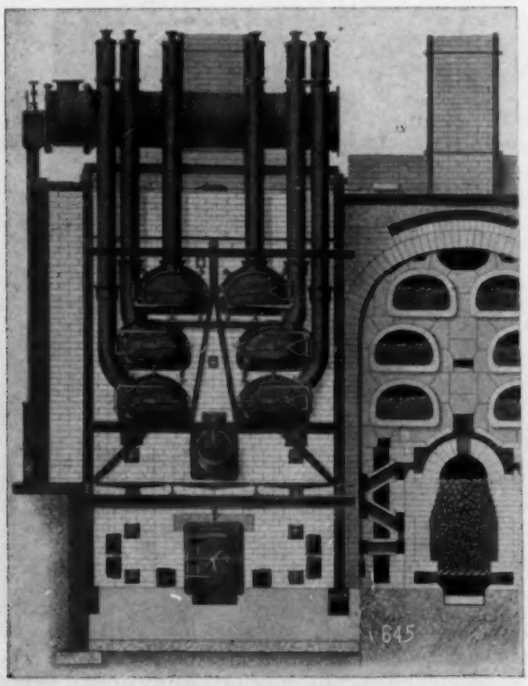
Twenty-four years is the extent of the service that has been given the gas industry by The Gas Machinery Co., of Cleveland, Ohio. Just what changes have taken place during this period in the design and construction of gas making equipment is described in the followig story and illustrations that accompany it.

We are indebted to W. E. Steinwedell, secretary of the company, for this contribution to the Manufacturers' Symposium.

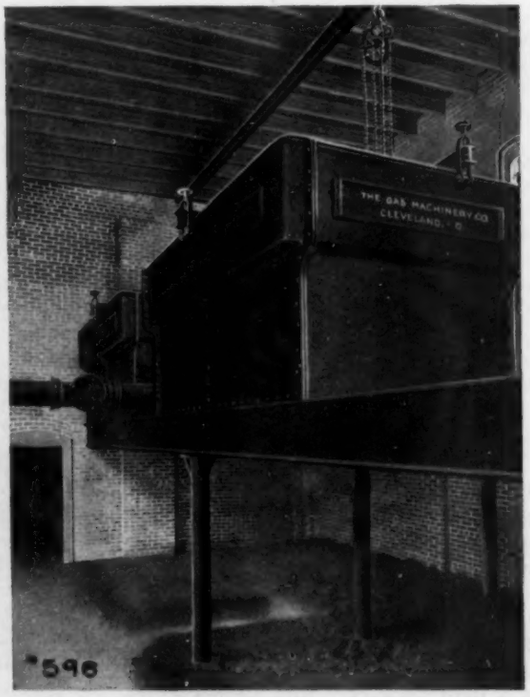
"The machinery and equipment furnished beginning with the Fall of 1902 when The Gas Machinery Company first started in business as compared with the machinery furnished now in the year 1926 shows the advances in the art and the tendency towards greater capacities, efficiencies, and the elimination of labor.

W. E. Steinwedell, Secretary, Gas Machinery Company

"The Gas Machinery Company furnishes complete coal gas plants and water gas plants, as well as by-product machinery, valves, and the various parts that go to make up plants of the above description, and the personnel of the company has remained practically unchanged for a number of years."



Coal Gas Retort Benches, Gas Machinery Company



Cast Iron Purifiers With Wet Lutes, Gas Machinery Company

COAL HANDLING MACHINERY

The prime function of coal handling machinery is to convey this basic material for manufacturing gas, from the point of reception—either barge, ship or railroad car—to the retorts, generator, gas producer, boiler room or to storage space, with the utmost dispatch and the minimum of labor and expense.

The advantages of the modern gas men have over their predecessors, are set forth in the following article written by P. S. Moore, of the C. W. Hunt Co., Inc., manufacturers of coal handling machinery, West New Brighton, New York City.

"Few of the older type of gas men who have experienced the back-wrenching, sweat-producing, slow, expensive and utterly inefficient method of handling coal and coke with barrow and shovel that prevailed half a century and more ago, are now living.

"Primitive indeed were the methods used. For example:—In 1859, the New York Gas Light Co., because they had no docks of their own, were obliged to cart all their coal to their storage bins many blocks from the English vessels which conveyed it. In 1868, on the West Coast they had even greater difficulties. The San Jose Gas Co., San Jose, Cal., 'packed' their coal on mule-back from the southernmost point of San Francisco Bay,—where it was brought by ships,—to the gas plant.

"Such were the archaic methods—as we now view them—made necesarry by conditions then existing. It was not until the early 70s when changes occurred that enabled the gas man to rid himself of a goodly portion of the drudgery and expense of getting his coal where he wanted it and in the best possible time.

Mast and Gaff Hoist

"The first improvement made by Charles W. Hunt, was a hoist known as the Mast and Gaff, consisting of a rigid mast with a flexible boom attached to a 'bull wheel', the motive power being either a mule or horse,—as illustrated here. The average capacity was 75 tons of coal per day.

"Next in order came the Hunt Coal Elevator, capable of handling from 25 to 30 tons of coal per hour from barges.

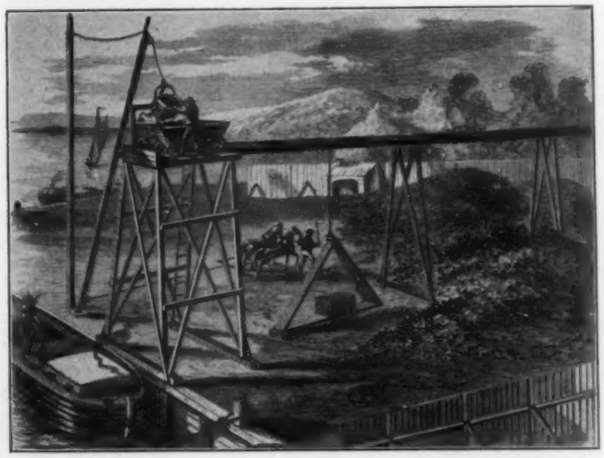
"Then followed the Steeple tower, an improvement over the former type, with a capacity of 180 tons of coal per hour.

"The Hunt Automatic Railway, (patented) which made its appearance in 1872, completely revolutionized the handling of coal at the waterside—as most of the coal was received at this point in the early days.

"From scientific and trade papers of that day, is culled the following description.

> 'This railway requires no horse or steam power, but relies solely upon the gravity principle. Built on a slight incline, with the point of loading higher than the point of discharging. There is one car usually holding one ton which will travel 150 to 175 feet, deposit its load and return to the loading point in 30 seconds. Only one man is required to operate the whole railway, who has merely to dump the buckets as hoisted and start the car when filled, the workman does not accompany the car'.

The New Haven (Conn.) Gas Light Co. had such



Original Type Hunt Automatic Railway, Year 1872

an installation 540 feet long in 1877. The Municipal Gas Co., Mutual Gas Light Co., New York Gas Co., all of New York City, each had the Hunt Automatic Railway, also the Newark (N. J.) Gas Light Co., and the Citizens Gas Light Co., of Providence, R. I.

Principle Still Employed

This system of handling coal is still used, but greatly improved; the basic principle upon which it was designed, however, being correct, remains the same. It is very often used in connection with the Hunt Pivot Bucket Conveyor.

"Realizing the limitations of other means of transporting coal within the plant proper, C. W. Hunt designed the Pivoted Bucket Conveyor, which consists of a number of buckets so pivoted that they always maintain an upright position, irrespective of the direction in which the conveyor is traveling.

"The buckets are driven by chains supported on automatically lubricated wheels running on T rails. The chain is driven by pawls which provide smooth operation even should the pitch of the chain vary. Buckets are filled by a special filler which prevents overloading and spilling of material. These are in use at numerous gas plants.

"C. W. Hunt's contribution of time and labor saving machinery to the gas industry also includes cut-off valves or gates for controlling the flow of coal, coke and ashes from storage bins and hoppers. Steeple towers for hoisting coal from boats and barges; Gantry bridges, for handling coal over wide storage area; Hoisting engines, especially adapted

Mitchell Electric Vibrating Screen

for all hoisting purposes; Cable and Industrial Railways complete with tracks and switches, etc.

"The Skip Hoist was perfected by C. W. Hunt to facilitate the handling of coal, coke and ashes in a vertical or inclined direction. This type of apparatus is used in a number of gas plants and found very effective. Capacities range from 25 to 300 tons of coal per hour.

W. S. Woodward, Jr., President, C. W. Hunt Co., Inc.

The Vibrating Screen

"The latest unit to be added to this large array of gas plant helps is the Mitchell Electric Vibrating Screen—illustrated here—used primarily in the gas plant for cleaning and sizing coke.

"The Mitchell Screen operates on a principle which is new and yet old. the sole actuating force is unbalanced centrifugal force, which is controlled in such a manner that it is made to vibrate the screen cloth. The movement, which is similar to a hand-shaking screen, moves the material upward and sidewise simultaneously, at the unprecedented rate of sixty times a second, It has great capacity and will screen material either wet or dry.

"Thus, for over half a century Hunt apparatus has been intimately identified with the gas industry and naturally, as time advanced, refinements were made that added to the effectiveness of the apparatus, by the aid of which the handling and rehandling of coal, coke and ashes in the gas plant has been performed with the greatest facility at substantial savings in time, labor and money."

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RECOVERING HEAT IN THE GAS PLANT

Economy in fuel consumption is sought after by every plant manager, and the gas works superintendent is no exception to this rule. Accordingly, the description of the LaMont waste heat boiler for absorbing heat from the blow gases of carburetted blue gas sets, given below by Gardner W. Wood, of the LaMont Corporation, New York, is of interest to the water gas engineer.

"One of the most recent developments in the field of gas plant auxiliaries is the LaMont waste heat boiler, which was designed especially for absorbing heat from the blow gases of carburetted blue gas sets.

"As a boiler it is unique in the manner and extent to which the laws of heat transfer are followed, viz.: length of gas travel, close spacing of heating surface, speed of gas travel, free film or free surface evaporation, speed of water circulation and counterflow with the lowest temperature of fluid entering at the top.

"In the cooling of blow gases approximately similar to that of steam without economizers or air preheaters, the small heat differential available in waste heat application is completely used.

Other Features of the Apparatus

"This economizer effect obtained by true counterflow does not wholly account for the efficiency of the LaMont boiler. The use of the film principle in combination with the pump permits the utilization of very long, small tubes without the "gulping" action which inevitably occurs in such small long tubes filled with water, and in addition it permits the injection of more water into the tubes than can possibly be evaporated, thereby eliminating the possibility of 'flash' evaporation, with its attendant evils.

"The LaMont boiler utilizes seamless steel tubes about 25 feet long by ⅝ inches O. D., with a 1/16-inch wall thickness, leaving an inside diameter of ½ inch. These tubes are arranged in rows, each row being expanded into an upper and lower header, the row of tubes with its headers being known as a tray. The number of tubes per tray and the number of trays per boiler are determined by the amount of heating surface required for a given capacity of gas set. The small internal area of the tubes, headers and piping, together with the absence of a steam drum, combine to insure a maximum of safety and strength. The spacing of the tubes in the tray is very close at the top (approximately ⅜-inch apart) and wider (approximately ⅝-inch) at the bottom. The spacing of the trays is arranged to correspond with that of the tubes in the tray. The reason for this is to follow the temperature gradient through the boiler so as to get approximately the same velocity of gases at all points.

"This close spacing of the tubes makes possible the use of a very high velocity of gas past the heating surface. It is patent that this feature is most valuable. It will be noticed that the gas passes parallel to the tubes in the LaMont boiler. This is also a striking advantage, as it leaves the entire circumference of the tube available for heat transfer and keeps the entire circumference of the tube clean. The close spacing of the tubes and the consequent small volume of blow gas in the boiler shell is a further assurance of safety.

Water and Steam Circulation

"The internal water and steam circulation in the LaMont boiler is so rapid that no scale is deposited on the heating surfaces or connecting piping. The scale forming precipitates and any foreign matter is carried by the water through the entire system, where it is trapped on the strainer, L, whence it is blown to sewer whenever necessary. This is done by the use of a small amount of the hot boiler water. As the heating surface thus remains clean both inside and outside, the initial high efficiency of this boiler is maintained indefinitely.

"The dimensions of a LaMont boiler serving a 12 foot carburetted blue gas set consists of a shell only 5 feet in diameter and 30 feet high, containing 3,800 square feet of heating surface.

"The LaMont boiler is equipped with automatic controls and requires no more attention than is needed for a set blowing to atmosphere, except for an occasional blow down which generally occurs during the cleaning period and requires no more than two minutes."

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METER CONNECTIONS

Organized in the year 1909 by F. E. Stevens and M. A. Corbett, the company which thereafter became The Lattimer-Stevens Company, Columbus, O., has taken an active part in the development of meter connections and accessories as well as gas cocks.

We are glad to publish below the story prepared by E. M. Stevens, vice-president of the company.

"In 1909 F. E. Stevens and M. A. Corbett organized The Corbett-Stevens Company for the purpose of manufacturing meter connections, meter shelves and meter seals. The business of the company developed steadily. In 1916 Mr. Corbett's interest was purchased by George W. Lattimer, and the name of the company changed to The Lattimer-Stevens Company. Mr. Lattimer died in 1920 and was succeeded by his son, Gardner Lattimer, the present secretary-treasurer of the company.

F. E. Stevens, President, The Lattimer-Stevens Company

"From a small beginning the business has had a rapid growth until the products are sold in every state in the Union. The accompanying chart indicates the growth during the past twelve years.

"In addition to meter connections, shelves and seals, the company has been manufacturing gas cocks also for the past eight years. Its volume in this line has increased steadily.

"During the past year a new adjustable plug valve, designed especially for use in larger sizes and for higher pressure work, has been put on the market.

"The officers of the company are: F. E. Stevens, president; Charles W. Stevens, vice-president; E. M. Stevens, vice-president; Henry B. Dugger, vice-president, and Gardner Lattimer, secretary-treasurer."

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HORIZONTALLY CAST PIPE

The gas industry has been much dependent on the pipe manufacturing companies for solving their problems in the distribution phase of the business. Cast iron pipe has always played an important role in this connection and the manufacturers of cast iron pipe have always been ready to do their utmost to cooperate with the gas companies and to effect improvements in the design and construction of the pipe, the pipe joints, the weight of metal in the pipe and the like. This co-operation has been responsible for the good progress that the gas industry has made in the distribution field.

A. K. Akers, of the McWane Cast Iron Pipe Co., Birmingham, Ala., tells the story of his company below, emphasizing particularly the development of the horizontally cast pipe and the precalked joint.

J. R. McWane, President, McWane Cast Iron Pipe Company

"The growth indicated for the McWane Cast Iron Pipe Company of Birmingham by the increases in its plant capacity has been taken as the measure of the acceptance of the two major ideas that activated the formation of this particular company.

"These are:

"1. The casting of iron pipe horizontally in green sand.

"2. The equipping of such pipe with lead and jute self-tightening joints already made up in the pipe bells.

"Securing these two results is based on some twenty-odd patents held by J. R. McWane, president of the McWane Cast Iron Pipe Company, of Birmingham, Ala., and of the Pacific States Cast Iron Company, at Provo, Utah.

"It is the view of Mr. McWane, long a national figure in the manufacture of cast iron pipe, that increases in freight, material, and labor costs made necessary lighter weights in cast iron pipe than were safely obtainable under former processes of casting vertically in pits in dry sand molds.

Horizontally Cast Pipe

"In carrying out his ideas the McWane Company has developed a pipe cast horizontally in green sand, in standard lengths, bell and spigot type, either with or without the McWane precalked joint.

"An interesting development of the green sand casting has been the production of cast iron pipe in extremely small sizes. For high pressure service this has given the gas industry the opportunity to avail itself of the long life of cast iron pipe in diameters as small as 1¼ and 2 inches. In such service many miles of such pipe have been installed, using for high pressure joints tobin bronze welding in the trench, or various types of couplings.

"It has become the practice in such cases to have the cast iron pipe welded together at the pipe foundries into lengths of from 18 to 30 feet, as the castings in such small sizes are usually 6 feet in length.

The Precalked Joint

"In the precalked joint, designed for gas pressures of less than 10 pounds, the McWane pipe user only finishes the joints instead of pouring and yarning them in his trench. The precalked joint is made about a mandrel while the pipe is in a vertical position. In the order named, braided jute, a specially-prepared ring of iron wedges imbedded in lead, two more braids of jute, and a final filling of molten lead are placed in the pipe bells around this mandrel.

"As many gas engineers using lead joints prefer that the joints be practically full on completion, an additional ring of lead is furnished for precalked gas joints, which is calked into place after the joint is tested and found gas-tight.

"The policy of the McWane Company nas been to emphasize extending the use of cast iron pipe into smaller and smaller sizes although they are making gas pipe as large as 8 inches. With the great increase in street and highway paving in modern America there has come about an increasing demand for permanence in the pipe that is to go beneath this paving and in the rapid and substantial growth of the McWane Cast Iron Pipe Company is seen a reflection of the soundness of the idea—only permanent pipe should go under paving."

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LUBRICATED PLUG VALVE

The lubricated plug valve was the result of a need in the metallurgical field. From that industry it gradually developed and entered other industries as well, including the gas industry.

We are glad to publish below the story of the Merco Nordstrom Valve Company, San Francisco, California, written by Thomas Jabine, district sales manager in New York City.

"Development through necessity in the metallurgical fields of the West has given to the gas industry the lubricated cock. In 1916, S. J. Nordstrom, a metallurgical and constructional engineer, doing work for the bigger mining companies of Mexico, found it necessary to develop a valve with an especially constructed water-way, that would have a minimum of wear due to the slimes handled, and further a valve that would not stick, leak, etc. Later in 1916, the original Nordstrom patent, now embodied in the Merco Nordstrom Plug Valve, was taken out. The principle was shortly taken up by The Merrill Co. of San Francisco, metallurgical engineers in the gold and silver field. It was soon found that the chief application of this valve was in general industry, and a very important place in the handling of gas, particularly high pressure.

"For more than two years, a subsidiary company of The Merrill Co. has been handling this valve, until today, the Merco Nordstrom Valve Co. is a name familiar to gas men from coast to coast.

"It is possible by the use of this hydraulic lubricating system to manufacture a full 100 per cent opening valve, in cock design, in sizes even up to 16 inches. Development work is being done on sizes larger than 16 inches. The advantage of these large size valves has been recognized by many of the gas companies, where it is necessary to secure a valve that will shut off tight, will not stick, that is always free to operate —no broken stems or dropped disks, or gates impossible to close.

"Two entirely new forms of cocks, both intended for either underground or surface operation, both fitted for operation and lubrication at any point most easily available for an operator, as for instance, the surface of the ground when considering a curb cock are made by the company.

Separate Lubrication Methods

"Three separate lubrication methods for operation of the valve when used in buried lines are employed, equipped in curb boxes. In cases of fire or where instant shut-off is needed; no matter it is is on a surface connection or on a distribution main; no matted if the pressure is a few ounces or several hundred pounds; lubricant from a convenient point can be added to the valve no matter where located, and the operation itself, that is, the turning on or off of the valve can be done at a convenient point without great expense."

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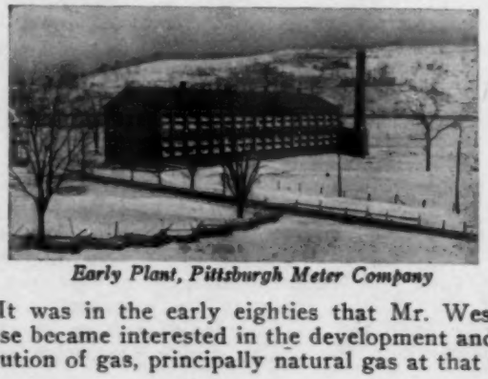
A METER COMPANY ORGANIZED BY WESTINGHOUSE

George Westinghouse, a name to conjure with in the electrical and railway industries, is also responsible for a company that today makes meters for the manufactured gas industry. Originally concerned with the manufacture of meters for the natural gas industry, the Pittsburgh Meter Co., Pittsburgh, Pa., today factors in the development of all sorts of measuring devices, including the gas meter.

J. E. Brown of this company has prepared the following story for this symposium.

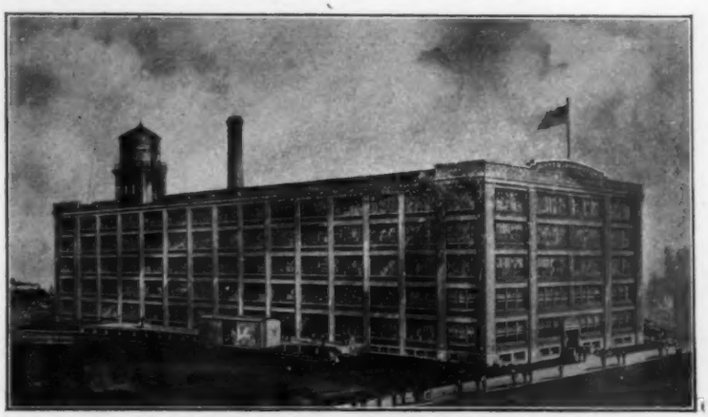
"The activities of Pittsburgh Meter Company in relation to the gas industry cover a period of more than forty years. Its inception was in the brain of George Westinghouse, nationally and internationally known for his keen interest and activities in various lines of industry and progress.



Early Plant, Pittsburgh Meter Company

"It was in the early eighties that Mr. Westinghouse became interested in the development and distribution of gas, principally natural gas at that time,

which had just been discovered to exist in the vicinity of Pittsburgh. His interest was so great that he drilled a well on his beautiful estate, 'Solitude,' in Pittsburgh. A splendid flow of gas was secured and brought under control. Then came to his mind the question of economical distribution. The flagrant waste of gas was distasteful to this practical man and, feeling the need for more economy in that direction, he invented a meter for the measurement of that product.



Present Plant of the Pittsburgh Meter Company

Further Development

"The success of this meter for the measurement of gas led to still further developments in the way of measuring devices for other kinds of fluid, including water, oil, etc., and from this interest on his part came the organization now known as the Pittsburgh Meter Company.

"The organization was first known as The Safety Appliance Company, later the name was changed to The Fuel, Gas and Electric Company, and again in 1895 to Pittsburgh Meter Company.

"The original plant was located in what is now downtown Pittsburgh. In 1890 it was moved to what is now known as North Side Pittsburgh, then Allegheny, and in 1893 was moved to East Pittsburgh where it remained until the spring of 1924.

"The original building of their plant at East Pittsburgh is shown in the small illustration. This was the first building in a vast unoccupied space, which has since been literally covered by the buildings of the Westinghouse Electric and Manufacturing Company.

"Progress means growth and growth demands expansion. Pittsburgh Meter Company has kept step with the march of progress. The plant at East Pittsburgh was extended a number of times, but the demands always very shortly exceeded each new development. Larger and better equipped buildings were required and, space not being available at the East Pittsburgh location, it became necessary to seek a new location. In 1922 the company broke ground for a new building on a 2½ acre plot at 7800 Susquehanna Street in the city of Pittsburgh. This building consists of six floors, 80 by 300 feet, as shown in the accompanying illustration. It has been occupied since the spring of 1924 and the wisdom of choice of location and additional manufacturing facilities has been proven by the vast increase in business since that time.

"The company manufactures meters of all types for all kinds of fluid and for all classes of service, particular attention being given to meters of all sizes and types for manufactured and natural gas. Among their products may be mentioned the already well known Ironclad cast iron dry gas meter, the Westinghouse improved fluid positive gas meter, the Westinghouse orifice meter and the Westinghouse proportional gas meter, the latter for natural gas only, the others for either natural or manufactured gas, many thousands of which are in use in all sections of the country. In addition to these gas meters the company manufactures upwards of 100,000 water, oil and gasoline meters per year."

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REFRACTORY CEMENT

An improperly built industrial furnace, boiler setting, water gas lining, retort installation, as far as the bond between the brickwork is concerned, means an inefficient apparatus. Particularly in the utilization of gas in industry is this an important point, for gas being an expensive fuel compared with oil, coal and coke, must be burnt in a furnace where the efficiency of the heating operation is the highest possible.

Thus, what appears to be a minor matter, the refractory cement used in making the joints and in repairing the settings and general construction of the apparatus, becomes a rather important item in the economy and efficiency of the operations that are carried out in these machines, whether it is the manufacture of gas or the manufacture of various merchandise by the use of gaseous fuel.

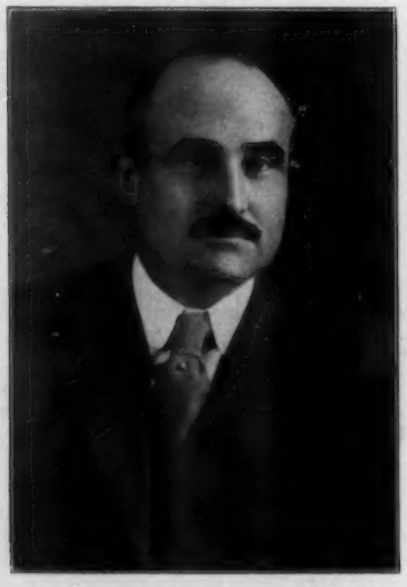
In the following article W. L. Mathews, of the Quigley Furnace Specialties Co., Inc., New York, tells of refractory cement that is made by his company and of its use in the gas industry.

"Ten years ago witnessed a remarkable rise in industrial activity, especially in the metal trades

Shipment of First Barrel of Hytempite (Quigley)

which was reflected in the activities of public utilities as well. Steel works, foundries and industrial plants were operating at high pressure and furnaces pushed to full capacity.

"It was in the spring of 1916 that an idea for getting greater service from refractories, which had been in the mind of W. S. Quigley for some time, took commercial form. Having had many years experience as a builder of industrial furnaces he realized that brickwork improperly bonded meant brief service—that thin cemented joints in brickwork should supplant thick joints of fire clay and that uniform brick bonded with an 'air set' cement through the entire thickness of the wall or arch was the solution of most furnace lining failures, such as falling arches and bulging walls.



W. S. Quigley, President,
Quigley Furnace Specialties Company

"Experiments carried on for several months resulted in the production and marketing of Hytempite by the Quigley Furnace Specialties Co., Inc., on a small scale at first, principally for repair work.

"Many gas companies tried out the product for patching retorts, making special tile and repairing brickwork for boilers and benches and for linings of water gas apparatus and vertical retorts.

"Larger manufacturing facilities became imperative. A plant site was located at Gillespie, near South River, N. J., and a fully equipped modern plant and laboratory erected.

"In developing export business, the growth of Canadian trade reached the point where a Canadian plant became advisable, so in 1925 The Quigley Company of Canada, Ltd., was formed with plant and main office at Lachine, P. Q.

"Realizing that prompt delivery and local service were essential, agencies with warehouse stock were established first in the eastern states and this service extended each year, until every large industrial center in the United States and Canada is now served. Foreign agents also encircle the globe so that 'The sun never sets on a Hytempite warehouse.' The brown East Indian of Calcutta, the natives of Latin America and the Japanese bricklayers with their colorful jackets are among those familiar with Hytempite and its uses.

Hytempite Work on Upright Retort, Shibaura Works, Tokyo Gas Company (Quigley)

"The barrel formerly used as a unit of shipment has now been replaced by hermetically sealed steel drums to insure fresh stock under any climatic condition so that all Hytempite is now shipped 'Sealed in Steel.'"

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GAS REGULATORS AND GOVERNORS

Founded in 1892 and reputed to be the oldest company manufacturing exclusively gas regulators and governors, The Reynolds Gas Regulator Co., Anderson, Ind., makes today a complete line covering the entire field of gas distribution. There is no question that the ability of the gas engineer to secure well-designed, ruggedly-constructed and accurately operating gas governors and regulators has done much to solve the difficult problems of gas distribution.

"The growth of the Reynolds Gas Regulator Company has been an interesting one. Starting with the idea of the inventor and founder, Miron Gillett Reynolds, in the summer of 1892 it has steadily grown and kept pace with the gas industry.

"The business was started in an upstairs room twenty feet wide and fifty feet long comprising one thousand square feet floor space.

"The first regulator manufactured was a Littel Giant House Regulator.

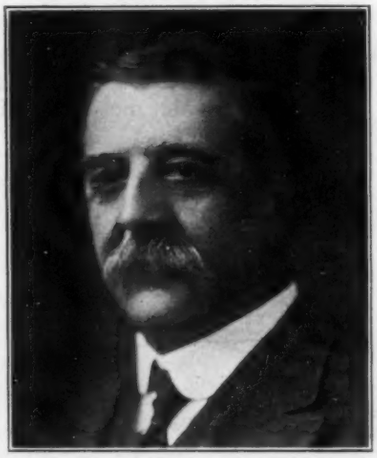
"Here the business outgrew the quarters and in the summer of 1901 the factory was moved to a building 30 feet wide and 80 feet long, comprising 2,400 square feet of floor space.

"During the days of natural gas in Indiana and Ohio a full line of natural gas regulators was manufactured, which reduced various inlet pressures from 6 ounces up to 300 pounds to an outlet pressure from

1 ounce to 30 pounds, according to conditions and type of regulator.

Entrance Into Manufactured Gas Field

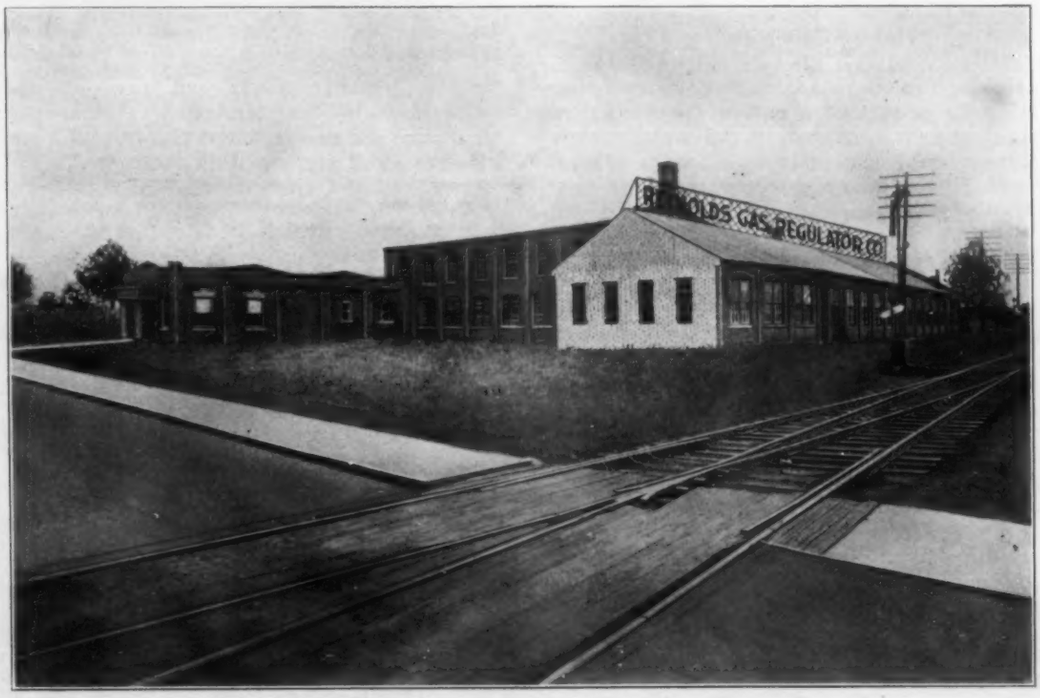
"As natural gas began to fail, artificial or manufactured gas was introduced. Because of the small size of pipe lines used in the natural gas operation, artificial gas was, in many instances, distributed under high pressure. This was made possible by the use of the Individual High Pressure Service Regulators with or without mercury seals. The Number 1 Regulator with ¾-inch inlet and outlet connections, and the Number 2 with ¾-inch inlet and 1-inch outlet connections were first made. Later, to meet certain conditions, the Number 2 was made with either ¾-inch or 1-inch inlet connection. A short time later the Number 3 Regulator, with 1-inch inlet and 1½-inch outlet connection and the Number 4 with 2-inch inlet and outlet connections were made. The Number 3 Regulator is now made with either 1-inch or 1¼-inch inlet connections and either 1¼-inch or 1½-inch outlet connections. Thus the entire field in sizes up to 2-inch was covered with the Individual High Pressure Service Regulators. This type of regulator will reduce a varying inlet pressure of 6 inches water column to 50 pounds to a low or outlet pressure of 2½ inches to 14 inches water column. This regulator also permitted the use of gas by individual customers from the high pressure belt line in the city, or made it possible for a gas company to have a section of the city fed with high pressure while the remainder was on low pressure. Several changes from the original type have been made to meet conditions as they have arisen, but the idea of close regulation has been maintained throughout.



Miron Gillett Reynolds, the Founder of Reynolds Gas Regulator Company

Station Regulators

"The Single and Double District Station Regulators were next developed, which enabled the gas companies to reinforce the low pressure distribution system with a high pressure belt line and then reduce the belt pressure to the distribution pressure at stations located in various parts of the city. The fact that the ordinary outlet pressure was not sufficient to give close regulation, a control system, which



The Present Plant of the Reynolds Gas Regulator Company

consists of a high and low pressure auxiliary governor and needle point valve, was perfected whereby a higher pressure than the outlet pressure is admitted to the auxiliary bowl. This gave the regulator more power and made close and accurate regulation possible and practical. This type of regulator will reduce a varying inlet pressure of 6 inches water column to 50 pounds to a low or outlet pressure of 2½ inches to 6 inches, or using a ¾-inch low pressure auxiliary governor with a contracted top, the outlet pressure may be varied from 2½ inches to 14 inches. By eliminating the high and low

First Plant of the Reynolds Gas Regulator Company Was in Small Room in This Building

pressure auxiliary governors, and using only the needle point valve and auxiliary bowl an outlet pressure up to 30 inches water column may be attained.

Holder Governor

"The Holder Governor was next developed to reduce holder pressure to the pressure carried in the distribution system. Using this type, the holder is filled at the off peak load and the gas feeds from the holder through the holder governor into the distribution system at whatever pressure is desired.

Low Pressure Service Regulators

"The Low Pressure Service Regulators were next introduced to permit the pressure in the distribution system to be boosted during peak loads to one pound, and at all other times of the day to carry the regular distribution pressure. This type holds the gas at the burner to a uniform pressure, thereby attaining perfect combustion and adjustments in the burner. It is made to deliver a certain outlet pressure according to the weight of the diaphragm plate, which cannot be changed without removing the top and changing the diaphragm plate. In order that the outlet pressure might be varied, the Low or Intermediate Pressure Governor was invented. It embodied all the principles of the low pressure service regulator with the added feature of screw cap top so that weights could be added or taken off to vary the outlet pressure without dismantling the governor.

"The High Pressure Line Regulator was developed to reduce gas in high pressure tanks carrying pressures up to 80 pounds to an outlet pressure of 1 to 15 pounds, which pressure is carried over a portion of the system before it is further reduced to inches water column with the single or double district station regulator.

New Quarters

"In order to have ample room for the manufacture of the entire line of regulators developed, it was necessary in 1907 to again move to still larger quarters. This move was to the present location, 1416 Lincoln street, which at that time had 10,600 square feet of floor space. Since that time two wings, a pattern vault and office have been built which added 5,000 square feet more of floor space.

"Back Pressure or Relief Valves and Automatic Anti-Vacuum Quick Closing Valves have been perfected in recent years, and certain minor changes in other regulators and governors to meet conditions as they have presented themselves. Special apparatus have also been made to meet specific conditions in the distribution of gas.

"It will be noted that the above regulators and governors cover the entire field of gas distribution from various inlet pressures of 6 inches to 80 pounds, and reduce to an outlet pressure from 2 inches water column to 15 pounds.

"The Reynolds Gas Regulator Company is the oldest firm exclusively manufacturing gas regulators and governors and never have deviated from this field. The Company is now in its thirty-fifth year and has always been a friend and helper of the distribution gas man.

"The present officers and directors are M. B. Reynolds, president and general manager; C. B. Reynolds, secretary and treasurer, and Floyd Gaunt, vice-president and assistant manager."

FROM THE OLD "THREES" TO THE MODERN "TENS"

It is a far cry from the old "threes" of the early days of the gas industry to the modern "tens" used today in the manufacture of coal gas. And the development has been not only in the number of retorts to the bench but to the design of the retort, the firing of the benches, the improvement in refractories and the like. The position of the gas industry today is due in no small part to these developments and its progress in the future will also be intimately connected with added improvements in the gas manufacturing operations.

D. B. Sutherland of the Russell Engineering Co., St. Louis, Mo., tells the story of his company in the following statement and the part that it has played along these lines.

"The Russell Engineering Company was formed in 1914 by the late Daniel R. Russell and took over the gas engineering department of the Laclede Christy Clay Products Company.

"The new company specialized in coal carbonizing units as well as refractories for all gas works purposes.

"While the company is only twelve years old the personnel is made up of individuals who have been engaged in designing, building and operating coal carbonizing units for many years and have been largely responsible for many improvements in the designs of coal gas retort benches.

Irwin Rawson, Vice-President and General Manager, Russell Engineering Company

"The engineering experience of the individuals in the organization covers the period of development, or rather evolution, of the gas retort bench from the free firing bench to the present day efficient coal carbonizing unit.

Old Bench Inefficient

"The old time bench with a free firing furnace, small retorts, mud-luted mouthpieces and bridge pipes was most inefficient, measured by the high standard of today, particularly in plants of large sendout.

"The first step toward improvement was the addition of air flues in which the air for combustion was heated. The fire boxes were then gradually increased in size and more waste gas flues added.

"The development of recuperation of heat in benches included methods of control and heat regulation as it was found that it was extremely difficult to secure an even distribution of heat throughout the setting, without control on the furnace gas for combustion and waste gas as it passed through the recuperators to the chimney.

Modern Bench "Tens" Charged and Discharged by Machinery (Russell)

"These developments made it possible to build the furnaces deeper and the bench as a unit began to assume larger proportions.

"Recuperating waste heat, controlling and dividing combustion and improving and refining the furnace design had a number of definite advantages, but the very efficiency of these developments brought an aftermath of trouble. The higher heats, more readily obtained, made heavier charges possible but played havoc with the fire clay retorts and settings which were used at that time.

Use of Heat Resisting Silica

"The next move was to substitute heat resisting silica for fire clay. Little, if any, change was made in the design of the retorts or settings when silica first superseded fire clay. The silica retorts were made in sections instead of one piece like fire clay retorts but otherwise the designs were essentially the same.

"The early designs using silica were not entirely satisfactory and it soon became apparent that the retorts, as then designed, could not conveniently hold such charges as the higher heats really provided for and that it was necessary to redesign the retorts and the tile setting to meet the new conditions.

"The retort mouthpieces during this period had been developed from the crude mud-luted lid to the present self-sealing mouthpieces that conform in size and contour to the three center crown retorts with high sides that had been adopted.

"The adoption of this shape and size of retort and mouthpiece permitted larger charges, particularly in the hand-operated plants, as with this design a large charge was possible with sufficient space over the coke for the easy admission of the drawing rake.

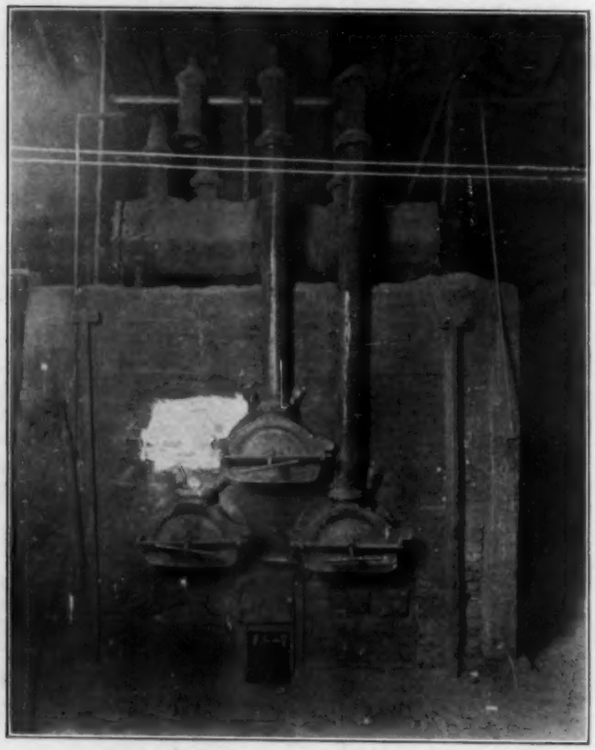
Advantages Gained

"The size and shape of retort had several other distinct advantages. It economized space and increased the velocity of the gas passing to the offtake pipes by the reduction of vacant space in the retort, thus decreasing carbon deposits and decreasing the danger of the formation of naphthalene and pitch.

"Up to this time the main arches for benches of

sixes were either of the semi-circular or three center type, both necessitating placing the top retorts close together, reducing the free space for the products of combustion and making it difficult to maintain an even heat from front to back and from bottom to top of the setting. This largely offset the benefits resulting from improved furnace, combustion control, silica retorts, etc.

"Instead of a semi-circular main arch, a single



Bench of Free Firing "3s"
(Russell)

radius segmental arch was used, permitting of placing the three rows of retorts on the same centers thereby eliminating the restriction between the top retorts and providing a vertical heating flue of the same dimensions from the combustion chamber to the tops of the retorts. This unrestricted flue, in connection with dampers in the recuperators and chimney, made it possible to control the heat to a remarkable degree.

"Placing the retorts vertically above each other permitted the use of side pipes with long radius bends instead of pipes with sharp angles which were difficult to clean.

New Standpipe System

"The most recent development in gas bench design is the Congdon Scrubber Standpipe System, replacing the old style bent side pipes and straight standpipes, and in which the Russell Engineering Company has embodied many improvements over the original design.

"With the Congdon System two vertical pipes serve each bench whether they be sixes, eights or tens. In these straight pipes there is no place for tar, carbon, etc. to lodge. This matter is washed downward by a spray of water or liquid into a seal pot and thence overflows into a separating well.

"The falling spray scrubs and cools the rising gas and flushes the interior surface of the pipe as well as the valves which are used to seal off a retort during the discharging and charging period.

"The accompanying photos show an old-time bench of "Threes" with free-firing furnace and mud-luted mouthpieces, a modern bench of sixes equipped with scrubber pipes and a battery of modern benches of tens with through retorts, charged and discharged by a machine."

REGULATION IN GAS MAKING

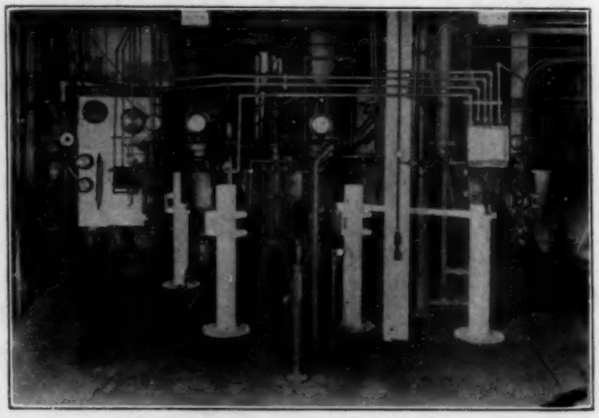
It is all very well to have efficient gas-making machinery and to understand perfectly the chemical operations that are carried out in these machines, but it is impossible in any chemical process to obtain good results unless there are some means present for controlling the mechanism of the chemical reactions that take place. The chemist in the laboratory has his two hands and his watchful eyes which can see all that goes on in his beaker, his crucible or his glass retort, and which can manipulate the stirring rod, the thermometer, the valve on his Bunsen burner. Thus he secures perfect control of his operations.

It is however another matter to control operations in which tons of materials are hourly being converted into gas, and where the need of regulation is as great even if not greater than in the laboratory.

Hence those manufacturers who have been engaged in the development of gas making control have been concerned with a most vital part of the manufacturing operation. Their work in conjunction with the gas engineers of the various gas enterprises in the country has done much to promote the progress of the gas industry.

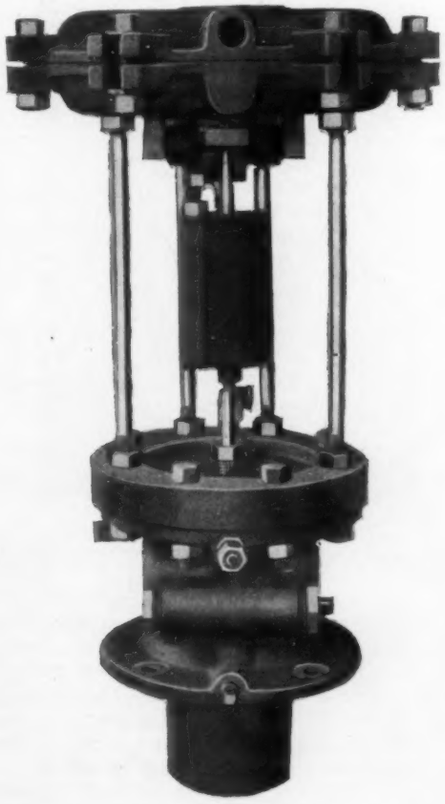
In the following article C. J. King, vice president, Smoot Engineering Corporation, New York City, tells of the progress in modern gas regulation and of the part played by his company in this field.

"The present day ideas of automatic control devices used in modern power plants and by gas produc-



Smoot Control—Water Gas Installation

ing industries are fundamentally not new, but rather are the culmination of many years of careful experimental and development work conducted in a field where ingenious schemes must give way to sound and practical ideas.



Original Piston Type Smoot Regulator

"Some ten years ago, with this thought uppermost in mind, Charles H. Smoot, engineer, scientist and business man, introduced to these industries the now well-known "Smoot Control."

"Long years of close contact with the gas, steel and copper industries, coupled with the design and manufacture of high speed turbo blowers for their plants, was the background of experience behind the idea of a universally applicable regulating machine of standardized design, built for serious power plant use.

"In the Fall of 1918 such a machine, incorporating all of the important characteristics of the present fully developed Smoot Regulator, was put in operation, controlling blast furnace gas pressure for heating horizontal retort ovens.

"During the Spring of 1919 these machines were used for the proportional control of gas, air and drafts in the plants of the Steel Company of Canada at Hamilton, the Algoma Steel Company at Sault Ste. Marie, Indianapolis Municipal Gas Plant and the Wisconsin Steel Plant at South Chicago.

"Application of the Smoot regulator to the various by-product coke plant problems rapidly spread throughout the country as the advantages of a perfectly dead beat or stable regulator were quickly recognized by engineers in this field.

Regulators Useful in By-Product Plants

"For suction main control in the by-product coke plants these regulating machines were made extremely sensitive and built to respond very rapidly to pressure variations of the order of one-tenth millimeter water column.

"These powerful and accurate machines were first applied to suction main control late in 1919 and at the same time like machines were co-ordinated with the action of a fast-moving exhauster engine control giving a system of oven gas control equally accurate, powerful and stable.

"During 1920 machines of this type were installed in the Crucible Steel plant, Midland, Pa., Donner Union Coke Corp., Buffalo, and the Roberts Ovens of the St. Louis Coke and Chemical Co. at Granite City, Ill.

"The fact that the same machine worked equally well as a sensitive pressure reducing valve regulator, Corliss engine speed controller or turbo blower volume meter conclusively proved its merit as a suitable structure upon which to build a completely coordinated system of combustion control.

"Step by step this was done. Starting in 1921 with the complete control of chain grate stokers, giving at the same time steam pressure regulation, quantity control of fuel and air plus zone pressure distribution of the forced draft air to the traveling grate, up to the present date, solving the most modern application of steam generators and powdered fuel installations.

"About this time Mr. Butler, of the U. G. I. Syracuse Gas Co., confirmed our belief that this system of grouped proportional control could be worked out in conjunction with the operation of an automatic water gas set.

"As these ideas seemed rather radical at the time they were set aside for immediate constructive work, such as the adoption in 1921 of the Smoot regulator by the Koppers Company for the control of low pressure steam to water gas generators.

A Novel But Simple Plan

"The simple plan of dividing one regulating machine's stroke into two functions, one of controlling the travel of a high pressure make-up valve for deficient exhaust steam and the other regulating an atmospheric relief valve for control of the surplus exhaust steam, proved novel in operation and a worthwhile investment from a steam-saving standpoint.

"A subject of interest to the reader may be the apparent need of extremely close regulation of gas and air in the manufacture of electric lamps, bulb-blowing machines and wire drawing and enamelling processes.

"With the advent of the unit rotary lamp machines

in 1922 the need of a very accurate control of the gas and air pressures feeding these machines became apparent as even relatively small variations in either speed of rotation of these machines or fuel pressure meant enormous wastage.

"Within a year's time nearly all of the Edison Works of the General Electric Company were equipped with Smoot regulators and the very commendable policy of their engineers in giving out data regarding their methods of regulation resulted in the use of this type of pressure regulator in nearly every lamp manufacturing plant in the country.

"The present trend in this class of work is to automatically correct for variations in the quality of gas as well as to control for the pressures within narrow limits, thus preventing small density or B.t.u. variations in the gas from disturbing the pressure-speed timing of the lamp machines.

"Characteristic of the progressive spirit among gas men today was the adoption in 1924 of the complete Smoot control for the new boiler plant at the Spring Gardens station of the Consolidated Gas, Electric Light and Power Company of Baltimore.

"Fully realizing the advantages of this type of equipment after extensive use, their engineers recommended the installation of a like control, consisting of essentially the same apparatus, giving a centralized proportional means of controlling the quantities of air, steam and carburetor oil on two of their U. G. I. gas generators.

"This system gives the operator a new method of running his generator efficiently in addition to the automatic gas maker so commonly used in modern plants.

"In addition to the automatic device the Smoot control comprises a master controller, primary and secondary air regulators, steam flow and oil flow regulators, so arranged that the rates of flow of these various elements are maintained or varied at the will of the operator, independently of each other and not influenced by the changing or interfering conditions in the machine.

"The results obtained to date have proved beyond doubt the soundness of this promising advance in the control of gas making.

The Accumulator

"Again the wide-awake attitude of the modern gas engineer is illustrated by the remarkable recent growth of the low pressure steam accumulator idea.

"The Smoot accumulator is a decided departure from the older type of heat reservoir, where sluggish action caused by slow water circulation limited its use to cycles of operation much longer than the conventional run and blow periods of water gas practice.

"With the years of development and sound engineering behind the Smoot regulator, an ideal control device presented itself for the job of controlling the output of the accumulator to the gas machine. Again the regulating machine played a dual role, holding the low pressure steam to the set at an exact pressure value, as well as making up any discrepancy in the exhaust steam to the accumulator by promptly operating a high pressure valve, but only after the low pressure control valve reaches its full open position, indicating an exhausted condition of the accumulator.

"In this manner every pound of exhaust steam is used and at no time can more high pressure steam be taken than is just necessary to maintain the desired low pressure at the base of the generator.

"Modern trend of operation is toward lower pressures at this point, which is excellent practice, as the advantages of steam saving due to such low pressures are now well-established facts.

"However, with the lower pressures a larger percentage of error in the quantity of steam delivered at constant pressure is had, due to variations in back pressure resistance caused by irregular vaporization of the carburetor oil.

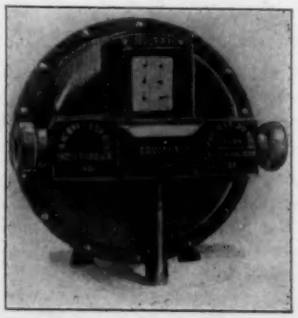
"This is very noticeable in plants sending out mixed coal and water gas, as in this case the gallons of carburetor oil needed may change hourly over as high as a two-to-one range.

"Remote control volume regulation of the steam to the generator is undoubtedly the answer to this problem and the Smoot regulator is equally as effective on a volume basis as it is when used to control for pressures.

"In the last eight months fourteen stations have been equipped with Smoot accumulators and regulators."

METERS AND HIGH PRESSURE SERVICE REGULATORS

The men who use the machines in their daily work should and must co-operate with the men who make them. It is only in this way that real progress can be made. The mutual assistance that these groups can and should give each other goes far towards the building of an industry that functions in the most effective and economical manner possible.



Single Diaphragm Meter First Made by Sprague Meter Co.

In the following statement which has been prepared for this symposium by E. L. Ballou, assistant sales manager of The Sprague Meter Co., Bridgeport, Conn., makers of gas meters and high pressure service regulators, it is gratifying to find a gracious acknowlegment of the "debt owed to many gas men and in particular to the meter shop men for their invaluable constructive suggestions."

Mr. Ballou tells of the general history of his company and of the work that it has been doing for the past thirty years in the gas field.

"Thirty years ago, in 1896, H. H. Sprague, now president of the Sprague Meter Company, started to manufacture a cast iron gas meter with a single diaphragm at Indianapolis, Ind. The sale of this meter was confined to the natural gas field.

"A few years later Mr. Sprague developed a cast iron meter with two diaphragms and the same general type of valve and other mechanism used in our present standard meter. This meter was known as the No. 1 meter and thousands of them are now in

F. P. Hutchinson, General Manager, Sprague Meter Company

satisfactory service. While this development work was in progress Mr. Sprague moved his shop to Bridgeport, Conn. W. P. Hutchinson, who for many years has been vice-president and general manager, entered the business in 1906.

"In 1907 the H. H. Sprague Company was incorporated in Connecticut under the name of The Sprague Meter Company. The same year the company brought out the No. 1A type meter with many refinements and greater capacity than the No. 1 meter.

"In 1911 the company started manufacturing high pressure service regulators. For fifteen years this branch has been growing with steady increase. Our aim has not been to build a cheap regulator but to build a regulator with high standards in workmanship and material.

"The Dreadnaught Type meter was added to the line in 1916—the object being to give to those engineers who prefer the Glover D-type slide valve their choice of type desired.

"Our constant aim has been to build better and still better material, and we owe a great debt to the many gas men and in particular to the meter shop men for their invaluable constructive suggestions."

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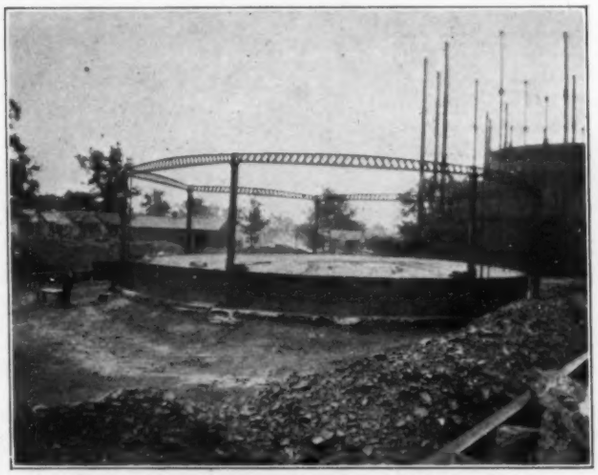
PROGRESS IN GAS HOLDER CONSTRUCTION

The gas holder of 1880 is quite a different affair from the one that is used to-day. However, the development was a gradual one and the improvements that were made were carefully tested out before they were applied, which is perhaps one of the main reasons for the good service that gas holders have invariably given their owners.

Just how this development took place, the various steps and stages in the general progress of gas holder design and construction are given in the very interesting article which has been prepared for this symposium by P. C. Rodgers, of the Stacey Brothers Gas Construction Co., Cincinnati, O. Mr. Rodgers tells the story of his company and it is interesting to note his reference to research work that his company is doing, illustrative of the fact that the manufacturers, as well as the gas companies, are aware of the value of research and investigation in promoting the technical progress of their common undertaking, the making and selling of gas.

"Back in 1880 when James E. Stacey, followed shortly thereafter by Andrew J. Stacey, the present Stacey Brothers of the Stacey Brothers Gas Construction Company, started building gas holders, these holders presented a far different appearance from those now produced and erected under the guidance of these same men.



Old Pit Holder in Mobile, Ala.

"In those days gas plants were in most instances locally owned and controlled, and holder capacities of a few hundred thousand cubic feet were considered large. Holders were frequently built within brick buildings, the relics of which can be seen in many localities, and where erected outside they were usually of the single lift type and built in brick or masonry pits. Then also commercially pure wrought iron was available with the result that although the sheet iron used in the holder lifts was much lighter than is used today, many of these holders are in excellent condition after fifty years or more of use. Then No. 12 gauge material or even lighter (No. 12 gauge being less than 1/8 inch in thickness) was used in the intermediate sheets of the crown and shells, while some of the heavier sheets of the lifts were only about 3/16 inches in thickness.

"Then too the guide frames were usually built of cast-iron sections, such as are illustrated in the accompanying photograph, which shows the old pit type of holder with cast-iron colums and girders.

Development in Increasing Capacity

"Since that time the chief trends of holder developments have been towards ever increasing capacities and multiple lifts, steel tanks instead of masonry pits, and guide frames made up of solid structural sections, as well as towards the use of special steels, such as copper-bearing steel and American ingot iron in certain parts of the lifts.

"Considering the first of these trends, the experience of the Stacey Brothers Gas Construction Company is probably typical. This company has specialized essentially in holder construction of all capacities ranging from 250 cubic feet to 10,000,000 cubic feet. It has not confined itself principally to any particular range of sizes, but has endeavored to serve the moderate size gas plant. Its records show almost without interruption a gradual increase in the average capacity of the holders built each year until, in 1926, the average capacity will probably be little under 1,000,000 cubic feet. This shows a rather unusual growth in the requirements of the average gas plant, and although included in these figures is a 10,000,000-cubic-feet holder now being constructed for the Iroquois Gas Corporation at Buffalo, New York, there are on the other hand many small holders and holder repair jobs of extremely small capacities.

General View of the Stacey Bros. Construction Company Plant

Steel Tank and Masonry Pit

"With reference to the increase in the use of steel tanks versus masonry pits suffice it to say that the steel tank is far more economical to build, easier to watch and generally causes less trouble than the masonry pit. Only in holders of large capacities does the cost of the masonry pit compare favorably with that of the steel tank, plus the foundation for it. This depends somewhat, of course, on local soil conditions, but the statement is nevertheless generally true. Furthermore, while a masonry pit can be built satisfactorily and tight, it is comparatively more difficult to do this and to watch its performance than is the case with a steel tank.

"The Stacey Brothers Gas Construction Company has, in the past year, in conjunction with the Pittsburgh Testing Laboratories, conducted some extensive experimental research work on the subject of joint efficiencies and tightnesses, not only in the steel tank but also in the holder sections. These experiments and their results are too detailed to attempt to describe in this short article, but it is sufficient to say that by the use of special methods of drilling holes in the solid plates instead of punching, and by the use of special patented riveting machines and specially made rivets, one of the chief difficulties in holder construction, namely, tightness of joints, is being rapidly overcome.

Guide-Frame Construction

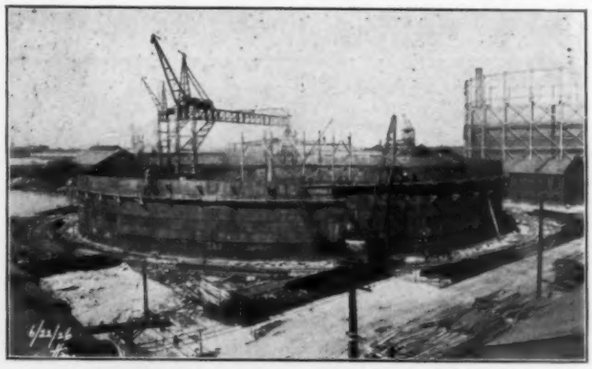
"The developments in guide-frame construction are no less interesting. After the use of cast-iron columns and girders came an era of latticed sections built up of comparatively light structural materials. This type of latticed construction is illustrated in one of the accompanying photographs. The chief enemy of this form of construction has been corrosion. The riveted joints of these light sections have slowly been eaten away and where flat bars or even angles were used they have become distorted. In modern holders solid sections are used with a minimum of riveted joints, thus reducing the points which the arch enemy, corrosion, can attack.

"In connection with guide-frame developments

may be discussed the improvements in carriage construction. In the early holders single-flanged rollers were largely used. Now, except in the smaller sizes, where lifts are fewer and heights not great, three bearing carriages capable of adjustment in all directions are used. Flat rollers are employed to eliminate the sidewise binding sometimes occurring on flanged rollers, and carriages on the large sizes are equipped with alemite or some equally good means of lubrication.

Use of Corrosion-Resisting Metal

"With reference to the construction of the lifts or bell of the holders we have already mentioned the



Iroquois Gas Holder, 10,000,000 *Cubic Feet (Stacey Bros. Gas Construction Company)*

use of copper-bearing steel or Armco iron to resist corrosion. It can be said with reasonable assurance that either of these special materials resists exterior corrosion better than ordinary steel. However, a well constructed holder built with standard materials will with reasonable care and painting last a very long period of years, while one built of either of the above special materials may not last nearly as long without the same care. Assuming the same attention, it is probable that the extra money spent for copper-bearing steel or Armco iron in the parts of holders most subject to corrosion, namely, the top and bottom rings of each lift and the cup and grip plates, as well as the top row of the tank, will bring ample return.

"The use of these steels in holders, however, has been so recent as compared with the life of the average holder that few positive statements can be made. Some questions have arisen as to the rate of interior corrosion when these steels are used. The metallurgical departments of the steel companies claim that these metals resist corrosion where a large percentage of carbon dioxide is in the gas, and that corrosion is not increased by high sulphur content.

"We have mentioned before the fact that the Stacey Brothers Gas Construction Company has been conducting research work on the tightness of joints. This, they believe, to have led to one of the most important developments in holder construction. By special jam riveters, the light sheet iron is being held tighter than ever before, and this is in their opinion even more important than the use of special steels.

Significance of Weight and Thickness

"Mere weight and thickness of material in holder construction means little in itself beyond a certain point. The addition of weight alone without regard to its distribution adds comparatively little to holder life. The additional cost of material used must be balanced against the additional life it will give and whether it is used in the places most needing the additional weight. The real factor beyond the point of conservative design is workmanship and joint tightness.

"A discussion of holder construction is not complete without some mention of painting. Recently experiments have been conducted by this company on various different grades of paint, including the use of some non-drying paints on the holder shells. At Hartford, Conn., on a 500,000-cubic-foot holder Stacey Brothers have used a new non-drying preparation known as Imunol. This, after being put on the lifts, is also floated on the surface of the water in the tank and recoats the lifts as they rise and fall. The Dearborn Chemical Company of Chicago also has on the market a non-drying coating known as No-Oxide which resembles cup grease somewhat in appearance and is applied to the lifts by rubbing. It is still too early to judge of the success of these paints, but the use of them will bear watching and is significant.

"In conclusion, please note the accompanying photographs illustrating a holder of modern design and

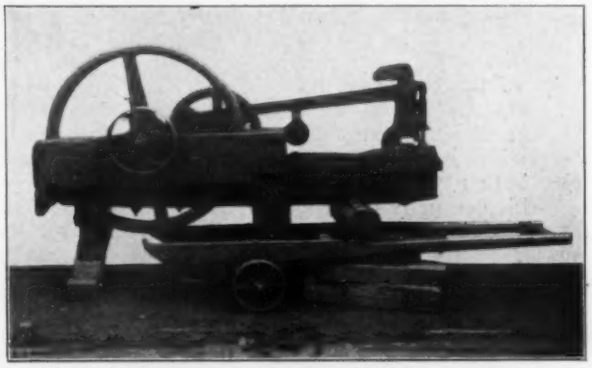


Fig. 1.
Old Hand Operated Punch (Stacey Mfg. Co.)

also the steel tank of a 10,000,000-cubic-foot holder now being erected by Stacey Brothers at Buffalo, New York, showing the method of riveting the heavy plates, some of which are well over 2 inches in thickness."

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BUILDING HOLDERS SEVENTY-FIVE YEARS AGO AND TODAY

An interesting story is told below of the methods that were in vogue seventy-five years ago in the building of gas holders and how they have improved since. The gas holder is, after all, the symbol of the gas industry, for it is the one part of the gas works that is familiar to all, although it is equally true that the average citizen does not appreciate its purpose and sometimes unfairly objects to its

presence. He does not know that without the gas holder there could be no gas works.

Edward J. Baechle, secretary and treasurer of The Stacey Manufacturing Co., Cincinnati, O., is the author of the following article which tells of the work of this company in the gas holder field.

"Seventy-five years of satisfactory service to the gas industry and pleasant relations with four genera-

Fig. 2
Modern Drill Installation (Stacey Mfg. Co.)

tions of gas men is the enviable record of The Stacey Manufacturing Company of Cincinnati, O.

"Having started in the gas holder business in the early fifties, under the name of George Stacey, father of J. Frank Stacey, now president and general manager of the company, its business has grown from small quarters to its present large and modern plant

"The Stacey Manufacturing Company is a name familiar to the ears of all members of the gas fraternity both old and new.

"This company's methods of fabrication and erection naturally have changed materially during its years of progress. Figure 1 shows the old hand-operated punch used by George Stacey for punching gas holder steel in the early fifties.

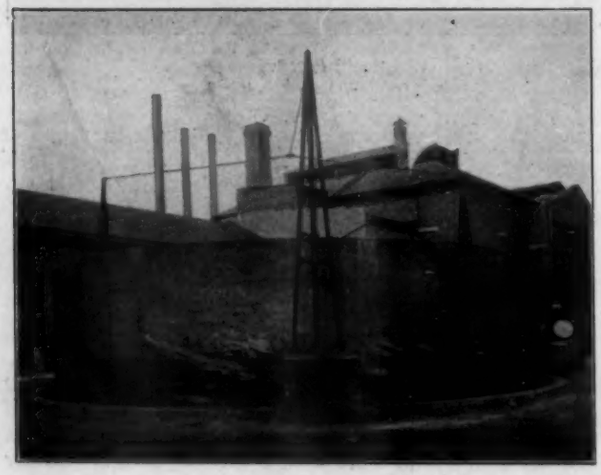

Fig. 3
Old Type of Holder (Stacey Mfg. Co.)

"Today the company has drilling equipment which drills eight holes through five one-inch thick plates at the same time and multiple punching machines which punch 120 holes in gas holder sheets in a single stroke. Figure 2 shows one of the drill installations used by the company in its present method of fabrication. The drilled hole, especially on the heavier materials, insures a better and closer fit in the field and naturally the company's improved shop methods have led to more and better equipment to improve the field erection, insuring the gas industry as a whole, better and longer life holders.

Arc Welding

"The development of the arc welding machine has led to a greater use of welded steel work for both

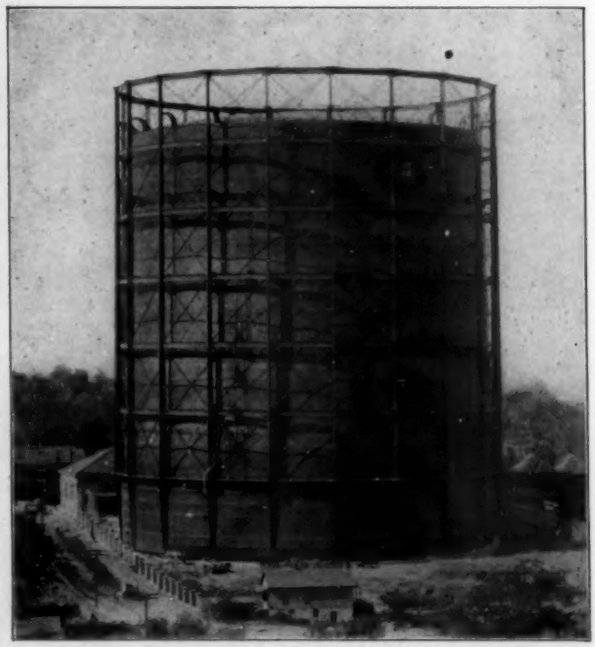

Fig. 4
Modern Holder Built By the Stacey Mfg. Co.

apparatus and pipe and fittings. The Stacey Manufacturing Company with a number of these welding machines in their plant handle work of this character and produce welded steel pipe and fittings to supply the demand that seems to be increasing for this class of material.

"The greatly increased gas consumption the past few years has necessitated greater pressures in the street mains to supply requirements and high pressure storage tanks are now finding favor as a means of relief for overloaded mains. These tanks can be filled during the off-peak periods, and by locating them near the end of a line the gas can be fed back into the mains when the pressure drops during the load or peak. The Stacey Manufacturing Company maintains in its shops up-to-date equipment, including large pressing machines for fabricating tanks of this character and they are in position to furnish economically any size or capacity designed to meet

the pressure requirements and storage needs of the purchaser.

Modern Holders of Large Proportions

"Naturally, like everything connected with the gas industry, holders today have grown to large proportions, and containers having capacities of from five to ten million cubic feet are becoming more and more a common size.

"In the eary fifties a double or two-lift holder was unheard of. Today five and six lift containers are continually being built to meet the ever increasing demand of gas and go practically unnoticed.

"Figure 3 will be a sort of reminiscence to the old gas man, which shows the type of holder used years ago and which was built by The Stacey Manufacturing Company in the early fifties. This holder was in good condition when it was dismantled in 1908 to make room for larger equipment of more modern design.

"One is quite familiar with the holder shown in Figure 4, which is of the five-lift type, having a capacity of 5,000,000 cubic feet. This is one of the many large holders built by The Stacey Manufacturing Company in recent years and is included in their excellent record as 'Builders of over 1,200 Holders.'"

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A SIXTY-SIX YEAR OLD METER

A meter, made sixty-six years ago will be on display at Atlantic City in the booth of the Nathaniel Tufts Meter Works. It illustrates better than words the long years of service of this company to the American gas industry.

H. A. Norton, manager of the company, has something interesting to say below regarding Nathaniel Tufts and the company named after him.

"The Nathaniel Tufts Meter Works will display a model 2 Lt. meter which is sixty-six years old, in their exhibit, Booths 27 and 28, during the A. G. A. Convention.

"This meter, recently returned by the Patent Office at Washington, carries the original card, stating that a patent was granted to Nathaniel Tufts, Jr., August 14, 1860. The two claims which were allowed cover a diaphragm constructed with two discs, the rear disc having an opening threaded to screw into the tin conductor brought down to the center of the division plate of the meter. The other claim was the placing of the long inlet channel on the top instead of the bottom of the table of the meter.

"This model meter was made by Nathaniel Tufts while in the employ of Thomas Glover, who, for several years prior to 1860, maintained a gas meter factory in Boston. There were four Tufts brothers engaged in the business, Nathaniel the founder, Scott the salesman, Eugene in charge of the factory, and Joseph in charge of the office. Prior to the advent of electric lighting the greater volume of their business was the manufacture of street, railroad and ship lanterns. Nathaniel Tufts died in 1890 and the business was carried on by his son until his death in 1893. Major C. W. Hinman was the manager of the company from 1893 until 1898, when he resigned to engage in the meter business for himself.

"He was succeeded by the present manager, H. A. Norton, who had become associated with the company in 1896. Mr. Norton was assistant superintendent to his father in the employ of the Nashua, N. H., Gas Light Company from 1882 until 1888, when he resigned to become New England manager for the Maryland Meter and Manufacturing Company of Baltimore, in the sale of gas meters and ranges.

"Eugene and Joseph Tufts were active in the affairs of the company until their deaths in 1910 and 1918.

"Of the several employees on our pension list, one entered the employ of Mr. Tufts fifty-one years ago. The majority of our workmen have been in our employ over twenty years. They have the training, ability and purpose to carry on the reputation established by Nathaniel Tufts and his brothers."

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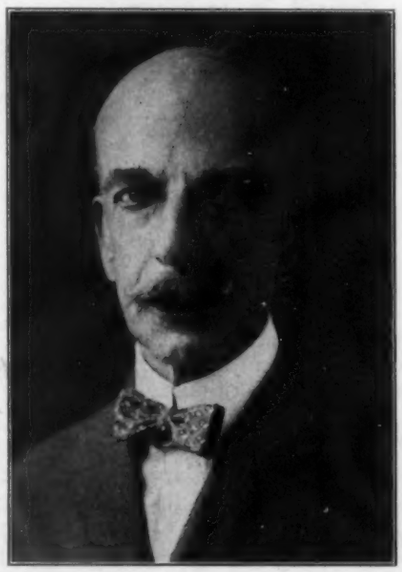
POTENT IN THE CARBURETTED WATER GAS FIELD

Water gas was at first condemned. By dint of education and publicity the original antagonism was removed. Today blue and carburetted water gas occupy a prominent position in gas manufacture.

In the article that follows, L. L. Moore, Sales Engineer, The U. G. I. Contracting Company, Philadelphia, Pa., tells the story of his company and of its relations to The U. G. I. Company. emphasizing the important position it has occupied in the carburetted water gas field since its acquisition of the Lowe patents to the present day.

"In writing the history of The U. G. I. Contracting Company it is difficult to clearly define where the United Gas Improvement Company leaves off and the Contracting Company, its subsidiary, takes hold. For the latter it is simply an extension and enlargement of the activities of the former in so far as the engineering and constructing end is concerned.



David J. Collins, Vice-President, The U. G. I. Contracting Company

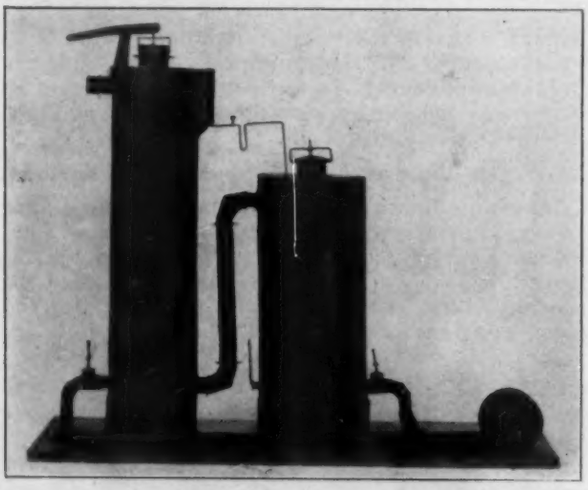
"The U. G. I. was incorporated in 1882 and its organization is practically coincident with the introduction of the manufacture of carburetted water gas and the beginning of the practices and improvements which have been adopted by the industry generally and accepted as standard today.

"The United Gas Improvement Company and the Contracting Company may be regarded as synonymous and are here referred to interchangeably, for the two organizations are always in co-operation to the fullest extent.

Acquires Lowe Patents

"Acquiring the basic patents for carburetted water gas manufacture from Prof. T. S. C. Lowe, The U. G. I. introduced into the gas industry an apparatus and method of manufacturing illuminating gas which was a radical departure from the accepted coal gas practice of the period. Naturally, it met antagonism from the coal gas interests and the industry had to be educated to this new and improved method of manufacture.

"Being alone in the field and pioneers in the art, The U. G. I. did much to accomplish this education and entered upon the design and development of the apparatus to meet conditions as they arose. In doing this



First U. G. I. Carburetted Water Gas Apparatus (Patent Office Model)

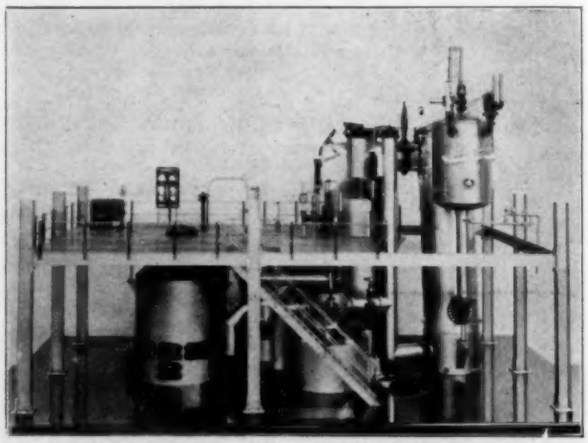
they likewise started the development within the organization of a class of gas engineers and experts who have since spread out and carried The U. G. I. influence and high standard of ethics and efficiency to many other public utility companies throughout the land.

"The broad statement is made that every important device and development in the art of carburetted water gas manufacture has been made by the U. G. I. organization. A list of these developments would require a space far beyond the bounds of this article.

Contracting Co. Organized in 1919

"In order to afford more lattitude for its activities, as well as greater flexibility of operation, the Sales, Engineering, Construction and certain other departments of The U. G. I. were, in 1919, organized into The U. G. I. Contracting Company. Then began an era of expansion in engineering, design and construction covering gas and electric properties, as well as dams, bridges, buildings, and other projects of a general character.

"The U. G. I. Contracting Company handles all of the engineering and erecting work for the parent company and in addition does a countrywide business with other public utility and industrial interests. Construction activities of the company extend throughout the country. Power plants of the latest and most efficient design have been constructed in Pennsylvania, New York, Connecticut, Texas, Iowa, South Carolina and Indiana and the gas plants built by the company may



Modern U. G. I. Carburetted Water Gas Apparatus, Showing Chrisman Cycle, Waste Heat Boiler (Operated on Soft Coal)

be found in nearly every state of the Union. Industrial buildings of various kinds have been constructed in many localities. Hydraulic works may be numbered among the company's activities, including those locks and dams built for the United States Government along the Ohio River. Bridges and roads have been built and many important roads in the eastern section of the country have been preserved with an important by-product of gas manufacture—"Ugite"—which is sold and applied by the Contracting Company.

Other Activities

"In addition to its engineering construction and road activities, the Contracting Company carries on extensive oxygen and acetylene business and operates six plants for the manufacture of oxygen as well as one plant for the manufacture of acetylene. These gases are largely used in welding and cutting operations upon metals, and the appliances and operators for them are supplied by the company.

"Extensive physical and chemical laboratories are maintained where constant research is carried on and tests of all descriptions made both for the U. G. I. and outside interests. Likewise, the Contracting Company maintains a department for the appraisal and valuation of properties of all kinds. In this department are experts who have made reputations for themselves which command the respect of the various Public Service Commissions. Representatives of this department have appeared before many courts and commissions in connection with rates and other matters to the mutual satisfaction of the parties concerned."

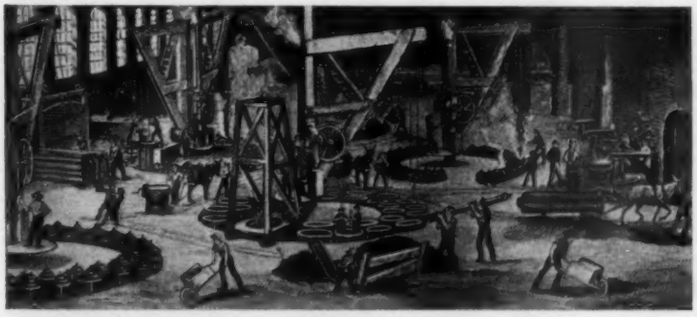
DE LAVAUD CENTRIFUGALLY CAST IRON PIPE

The Brazilian engineer, D. S. deLavaud, has the great honor of being the first to devise a method for the centrifugal casting of iron pipe to be developed on a commercial scale. This is the method that is employed by the United States Cast Iron Pipe and Foundry Company, Burlington, N. J. The details of this method are given in brief below by John D. Capron, Publicity Manager of the Company.

"The first cast iron pipe of which there is any record, supplying the fountains at Versailles, France, was laid in 1664. This pipe was made in horizontal sand molds and during the centuries since it was cast there has been no radical change in the method by which this pipe is manufactured. Cast iron pipe is still cast in sand, although most pipe foundries now use a vertical mold of dried sand.

"In the sand cast method of making pipe an impression is made in sand just the shape of the outside of the pipe. A core of sand is formed having the contour of the inside of the pipe and is lowered in place. Molten iron is poured in the space between the core and the mold proper. When this hardens the sand is broken away and the pipe remains.

"Cast iron pipe made by this process was inherently so satisfactory for underground installations that it was felt that little improvement was possible. However, by the utilization of centrifugal force in the manufacture of pipe a method has been developed that produces pipe superior in many respects to that cast in sand molds. This idea is not a new one and appealed strongly to early founders; in fact, the first patents covering the centrifugal casting of metals are dated over 100 years ago. The pioneers were handicapped by their efforts to follow ordinary foundry practice in using a sand mold, which was not strong enough to withstand the great pressure resulting from the force of rotation.



View in Early Pipe Foundry

The De Lavaud Process

"The method used by two of the largest pipe companies in making centrifugally cast pipe was invented by D. S. deLavaud, a Brazilian engineer, and was perfected commercially by the United States Cast Iron Pipe and Foundry Company. A metal mold is rotated horizontally and at the same time the molten metal is fed into the mold at a uniform rate of flow so that the rotary force throws the metal against the mold, forming the pipe. This eliminates the use of all cores except the small core for forming the inside of the bell. The centrifugal force acting on the molten iron forces from the metal all impurities and gives it a very homogenous structure. At the same time the cold mold cools the pipe, permitting its immediate withdrawal. From the mold each pipe is taken to the annealing oven, where any possible chill or casting strain is removed.

"Probably the outstanding feature of deLavaud centrifugally cast iron pipe is the remarkable increase in strength which results from this process. A comparison of the specifications for the two materials show that the metal from pipe cast in sand is required to withstand 20,000 pounds per square inch, as compared to 30,000 pounds per square inch for centrifugally cast metal. Actual tests show, however, that the deLavaud pipe will withstand a much greater load than the 30,000 pounds per square inch required. In fact, the average of a series of tests made under varied conditions showed that deLavaud pipe has a tensile strength of from 38,000 to 42,000 pounds per square inch. Other physical properties are also greatly increased.

Microscopic Investigation

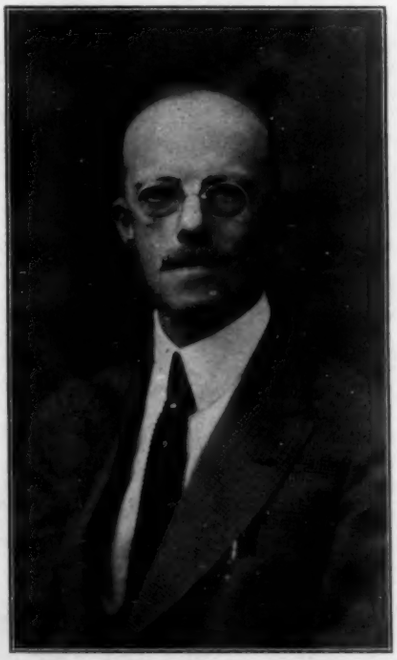
"A recent microscopic investigation of this material indicates that the strength of deLavaud iron is due to the "unusual combination and arrangement of structural elements." Under the microscope the iron from sand cast pipe shows the metal itself broken up by long flakes of coarse, black granite, a combination which is naturally weak. In the case of deLavaud pipe, on the other hand, we find small star-shaped grains of graphite which do not break up the metal and therefore do not have the weakening effect noted in sand cast iron.

"Cast iron pipe manufactured by this method is absolutely free from blow holes or impurities and has a much closer grain than sand cast pipe. This makes it of particular value for high pressure gas mains. The pipe is concentric in section and of uniform thickness which permits of the elimination of the excess thickness which must be included in sand cast pipe to allow for the possibility of a slight variation in pipe thickness. As the outside diameter is made the same as for sand cast pipe this reduction in thickness results in an increased carrying capacity. This is augmented by the smooth interior surface of the new pipe.

"The deLavaud process was the first method of casting pipe centrifugally to be developed on a commercial scale. In this country pipe has been produced under the deLavaud Patents since 1922."

EVERYTHING FOR THE GAS PLANT

Originally started on a very small scale in the year 1888, The Western Gas Construction Company, Fort Wayne, Ind., has grown into a company of large size and considerable importance in the gas equipment field. It has been a potent factor in the development of water gas and coal gas apparatus, purifying equipment, and, as A. E. Robertson, sales manager of the company says in his description of its progress below, it aims eventually to build a plant that will be able to furnish "Everything for the gas plant."



Frederick H. Beebe, Vice-President, Western Gas Construction Company

"In 1888 conditions appeared very favorable for an engineering firm in the middle west and a partnership was formed by O. N. Guldlin as manager and engineer, F. D. Moses, as superintendent, and W. A. Croxton, as secretary. These three gentlemen opened a modest one-room office in Fort Wayne, Ind. Considerable business was secured by Mr. Moses, and as the business continued to improve it was necessary to secure larger quarters, so a company was incorporated with Mr. Guldlin as the principal owner and president.

"A policy of introducing originality in design in gas apparatus resulted in a steadily growing business, and on the expiration of the Lowe patent on water gas apparatus in 1892, this company then entered the market with its own design and quite a few contracts were secured. This branch of the business was then vigorously pushed and has ever since been given special attention. Patents were applied for and allowed, covering the development of this apparatus, which developments have continued, and with additional patents still pending, representing the up-to-date type of water gas apparatus, now being built by this company, and in operation in some of the largest gas plants in this country and in Canada.

Machine Shop Started

"In 1893 it was clearly demonstrated that the business volume was in excess of what could be systematically handled, fabrication being entirely dependent upon outside shops for the execution of their contract. On account of this, ground was bought alongside of the Pennsylvania Railroad between Holton Avenue and Winter Street, on Buchanan Street, and the original machine shop was built about 65 by 100 feet as well as what was at that time considered a very commodious office building adjoining.

"In 1895 the machine shop was extended 150 feet including a complete installation of modern and special tools for the work. As the business kept growing it became more difficult to secure satisfactory foundry work as well as shell work. The company decided to establish a plate shop and foundry of their own and about one-third of each of the present shops were built in 1900.

"Up until the spring of 1904 the company was furnishing gas holders built by outside concerns and it was then decided to add such equipment to the works. The necessary construction was undertaken including the installation of complete, modern equipment of special tools for the construction of gas holders and steel tanks in addition to its previous complete equipment for general wrought iron and steel work.

"In the late fall of 1917 this company was reorganized and was taken over by The Koppers Company, of Pittsburgh, Pa. Under this reorganization the capacity of the machine shop was increased as well as the foundry, new machinery and equipment being added. A new cleaning room was built to take care of the cleaning of the castings. A new drawing room was built. The purchasing department and estimating department were housed in larger quarters.

Present Works, Western Gas Construction Company

"That the growth of the business was much underestimated was quickly demonstrated as to the plate shop and foundry by the energetic adaption and introduction of new designs of gas apparatus, such as the improved tar extractor, ammonia washer, etc., the success of 'Western Gas' valves, Duplex purifier system, improved ammonia washers, both for coal and water gas, improvements in water gas apparatus, the introduction of the company's system of coal gas condensation with intermediate tar extracting, also the introduction in this country of the Holmes rotary scrubber from Huddersfield, England, resulted in such a volume of business that it was again decided to purchase additional ground.

Changes in Plant

"Entire shop equipment was changed to electrical driven tools in all departments, complete heating and ventilating systems were installed throughout the plant. The pattern and pattern storage departments as well as the cleaning room for the castings were separated from the foundry and taken care of in commodious, independent brick buildings. The forge shop was also separated from the machine shop and developed into a modern and separate department by itself. The foundry was doubled in capacity, the original machine shop was entirely remodeled, forming the central part of the new gallery design of a modern machine shop equipped with double-decked traveling cranes, and the 1895 machine shop reconstructed. The office building also proved inadequate as the works was doubled in size. The tank shop received similar treatment and all the commodious yards were arranged for economical handling and storing of material by additional railroad switches and equipment.

First Machine—Western Gas Construction Company

"In the early part of 1925 it was found that the tank shop was not large enough to take care of the growing tank shop work, and it was then decided to purchase more ground for the erection of a larger and more modern plant. Subsequently twenty-seven acres of ground were purchased a short distance from the present plant site and plans were immediately made for the erection of a new tank shop.

First Machine Shop—Western Gas Construction Co.

Ground was broken late in this year and a building was completed the early part of 1926. This new tank shop covers approximately 65,000 square feet and is equipped with modern, up-to-date tank shop machinery. It is planned that this new plant site will eventually be the new plant of The Western Gas Construction Company, manufacturing 'everything for a gas plant.'"

OVER A CENTURY OF PIPE MAKING

Founded in 1803, R. D. Wood & Co., Philadelphia, Pa., has been making cast iron pipe for the gas industry over a century. Ores found in South Jersey smelted with charcoal from the pine woods and with shells from the seashore as flux furnished the iron metal in the early days, and today this company has adopted the latest development in the industry, the centrifugal casting process.

Charles R. Wood has written the short item which follows to form a part of this symposium.

"The above figures tell the story of well over a century in the experience of the manufacture of cast iron pipe.

"From the time when the early members of the Wood family made castings in South Jersey using the local bog ores a few feet under the ground with charcoal from the pine woods for fuel, and shells from the seashore for flux, R. D. Wood & Co. has continued making cast iron pipe without interruption.

"Modern methods have considerably changed the manner of manufacture, and at their exhibit on Young's Pier, R. D. Wood & Co. shows the latest sort of pipe to be made in this country.

"Called 'Sand Spun,' it is made by the centrifugal process in sand-lined or refractory molds.

"'The pipe they are now making at Florence, New Jersey, in their new shop is now being turned out in 4 inch, 6 inch, 8 inch and 12 inch diameters, and made in 16 foot lengths, which enables the user to save at least 25 per cent in the cost of laying his pipe.

"'Sand Spun,' as the new process is called, can be made in any thickness required, and is now being turned out to meet the A. G. A. specifications, or, as it is frequently spoken of by these manufacturers, 'Agaway.'"

AN ANNOUNCEMENT

IT is with deep regret that the American Gas Journal has to announce that it has not been able to include in its October 9th issue all of the stories that were sent in by manufacturers of gas plant equipment, nor any of the stories relating to gas appliance manufacturers.

While voicing this regret, it is, nevertheless, with a great deal of satisfaction and gratification that the American Gas Journal states that the co-operation that has been given it, in composing this symposium, has been far in excess of its expectations. The quality of the statements and stories furnished by the equipment and appliance manufacturers is very high. The stories are very interesting. The response of the manufacturers has been most gratifying, and at this point the American Gas Journal and its Editor particularly wish to extend their sincere thanks and appreciation for the co-operation that has been shown them by the manufacturers and that has helped so materially in making this symposium such a comprehensive document.

The stories of equipment manufacturers and all the stories of the appliance manufacturers which have been unavoidably omitted from this issue will be published in the October 16th issue—the post-Convention number of the American Gas Journal. This issue will also contain the latest news of the Atlantic City Convention, the latest reports and the various items that will be too late for publication in the Friday, October 15th, Daily.